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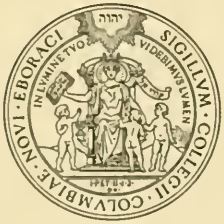

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THE TREATMENT OF GONORRHŒA IN THE MALE

BY THE SAME AUTHOR.

ON

THE STERILIZATION OF THE HANDS

A Bacteriological Inquiry into the Relative Value of Various Agents used in the Disinfection of the Hands

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'Mr. C. Leedham-Green's treatise "On the Sterilization of the Hands" is the outcome of researches on this important subject which have extended over several years. It is not only an account of these researches but a comprehensive critical review of the investigations of other surgeons on the same question. It is to be welcomed as a valuable contribution to the discussion of skin sterilization.'—*The British Medical Journal.*

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THE TREATMENT OF GONORRHŒA IN THE MALE

BY

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PREFACE

During the past few years a considerable advance has been made in our knowledge of gonorrhœa, and consequently in our methods of treating it. On the Continent several important monographs dealing with this subject have recently been published, but some years have passed since one appeared in England. I have therefore in the following pages endeavoured to give a concise yet detailed account of the modern views of the pathology and treatment of this disease, with a view to assisting students and practitioners to whom the foreign literature and our own scattered papers on the subject are difficult of access. I have included several chapters dealing with the chief complications of the disease. It seemed inadvisable to attempt to speak here either of stricture or of gonorrhœal conjunctivitis. The former is too extensive a subject to be adequately discussed in the space available, and the latter belongs more correctly to the domain of the ophthalmic surgeon.

Apart from the references in the text, I wish to acknow-

ledge my indebtedness to the recent writings of Guyon, Jadassohn, Kollmann, Oberländer, Wossidlo, von Zeissl, and especially to the teachings and works of Professor Finger, of Vienna, and Dr. Casper, of Berlin.

CHAS. LEEDHAM-GREEN.

BIRMINGHAM, *January*, 1906.

CONTENTS

PAGE

PREFACE - - - - - - - - v

PART I.

CHAPTER I

INTRODUCTION - - - - - - - 1

CHAPTER II

SOME IMPORTANT DETAILS CONCERNING THE ANATOMY OF THE URETHRA AND BLADDER - - - - - 3

CHAPTER III

ACUTE URETHRITIS - - - - - - 15

CHAPTER IV

ACUTE POSTERIOR URETHRITIS - - - - 19

CHAPTER V

THE BACTERIOLOGICAL DIAGNOSIS OF GONORRHŒA - 27

CHAPTER VI

THE MORBID CHANGES IN THE URETHRAL SECRETION AND MUCOUS MEMBRANE - - - - - - 34

CHAPTER VII

PAGE

THE TREATMENT OF ACUTE URETHRITIS - - 41

CHAPTER VIII

THE TREATMENT OF ACUTE ANTERIOR URETHRITIS - 49

CHAPTER IX

THE TREATMENT OF ACUTE POSTERIOR URETHRITIS - 56

CHAPTER X

CHRONIC URETHRITIS - - - - - 66

CHAPTER XI

THE DIAGNOSIS OF CHRONIC URETHRITIS - - - 74

CHAPTER XII

THE TREATMENT OF CHRONIC URETHRITIS - - 89

PART II.

THE COMPLICATIONS OF GONORRHŒA

CHAPTER I

BALANITIS, PARA-URETHRAL CANALS, PAPILLOMATA, PERI-URETHRAL INFLAMMATION, INFLAMMATION OF COWPER'S GLAND, LYMPHANGITIS AND LYMPHADENITIS - - 99

CHAPTER II

EPIDIDYMITIS - - - - - - 107

CHAPTER III

PAGE

PROSTATITIS - - - - 114

CHAPTER IV

SPERMATO-CYSTITIS - - - - - - - 122

CHAPTER V

CYSTITIS - - - - - - - - 125

CHAPTER VI

PYELITIS AND PYELONEPHRITIS - - - - 130

CHAPTER VII

GONORRHŒA RECTALIS—STOMATITIS AND RHINITIS - 133

CHAPTER VIII

GONORRHŒAL METASTASES - - - - - - 136

PART III.

THE PROOF OF THE CURE OF GONORRHŒA: ITS BEARING ON MARRIAGE - - - - - - - 141

LIST OF ILLUSTRATIONS

FIG.		PAGE
1.	Cast of Urethra	4
2.	Diagrammatic Sketch of Urethra and Bladder	5
3.	Shape of Bladder, according to Finger, when it contains but little Fluid	7
4.	Shape of Bladder when fully Distended	8
5.	Radiograph of a fully-distended Bladder	11
6.	Acute Gonorrhœal Pus	29
7.	Diagrammatic Representation of the Multiplication of the Gonococcus	30
8.	Urethral Secretion in the Earliest Stage of Acute Gonorrhœa	36
9.	Small Urethral Syringe	52
10.	The Ockart Urethral Syringe	54
11.	Valentine's Urethral Irrigator	60
12.	Guyon's Instillation Syringe	63
13.	Ultzmann's Syringe	63
14.	Chronic Gonorrhœal Pus, showing Secondary Infection with a Short, Slender Bacillus	77
15.	Feleki's Instrument for Massage of Prostate	78
16.	Acorn-headed Black Gum Bougie	79
17.	Otis's Urethrometer	80
18.	Weir's Urethrometer	80
19.	Kollmann's Urethrometer	80
20.	Simple Endoscope	82
21.	Schall's Endoscope	82
22.	Valentine's Endoscope	83
23.	Membranous Portion of Normal Urethra as seen through the Endoscope, showing Small Round Central Figure with Numerous Fine Radiating Folds	84
24.	Normal Prostatic Urethra, showing the Anterior Portion of the Caput	84

FIG. PAGE
25. Normal Prostatic Urethra, showing the Caput Gallinaginis - 85
26. Normal Urethra in the Middle of the Bulbous Portion. Central Figure Vertical - - - - - 85
27. Endoscopic Appearance of Chronically-Inflamed Urethra - 87
28. Large Urethral Syringe - - - - - 91
29. Urethral Ointment Introducer - - 92
30. Oberländer's Urethral Dilator - 95
31, 32, 33. Kollmann's Urethral Dilators - - - 95
34. Neisser's Suspensory Bandage - - 112
35. Sperm Crystals - - - - - 118
36. Urethral Thread in Chronic Urethritis - - 144

PART I.

CHAPTER I

INTRODUCTION

The term 'gonorrhœa' is a ridiculous misnomer in the light of its derivation from γονος, 'the semen,' and ῥέω, 'I flow'; yet the word is so universally adopted that it would be a useless and thankless task to suggest a more scientific name for this disease.

In the earliest records of prevalent diseases we find the disorder described with singular clearness and exactness. Greek, Roman, and Arabian physicians frequently refer to it in their writings; and we have evidence from the Book of Leviticus that the Jews at an early period clearly understood its nature and contagious character. In the Middle Ages its infectious nature was so well recognised that in many towns, both in England and on the continent of Europe, regulations were in force compelling the periodical medical examination of public prostitutes for 'the perilous infirmity of burning.'

Towards the end of the fifteenth century, when a great epidemic of syphilis spread over Europe, gonorrhœa, if not entirely lost sight of, was so overshadowed by the more serious venereal disorder that for a long time afterwards the two diseases were regarded and treated as identical. Indeed, it was not until the beginning of the

eighteenth century that the distinction between them was indisputably demonstrated and accepted by the medical profession. But long after this gonorrhœa was generally regarded as an inflammation, which might be occasioned by a variety of causes besides infection. Excessive bodily fatigue, indulgence in alcohol, as well as contact with menstrual and other discharges, were deemed capable of causing it.

These views, however, gradually gave place to more correct ones as to the nature of the disease, so that by the middle of the nineteenth century its specific origin was generally recognised.

It was in 1879 that Neisser first published a description of a coccus which was invariably present in all fresh cases of gonorrhœa, and to which he gave the name of gonococcus. A few years later Bumm first succeeded in cultivating the micro-organism on coagulated blood-serum, and in transmitting the disorder by inoculation to a healthy urethra with a pure culture of the coccus. These discoveries have been the basis of all subsequent treatment of the disease.

CHAPTER II

SOME IMPORTANT DETAILS CONCERNING THE ANATOMY OF THE URETHRA AND BLADDER

BEFORE proceeding to deal with the nature and treatment of urethritis, it is necessary to draw attention to the following anatomical details, which are of great practical importance to the surgeon, and which are not adequately discussed in the text-books on anatomy.

1. The Lumen of the Urethra.

In the resting state there is no true lumen to the urethra, for the walls are in contact, and are only separated so as to form a canal during the flow of urine and semen, or the passage of a surgical instrument.

The diameter of the lumen, or, more correctly, the extent to which the canal may be dilated, varies greatly in its different parts. The relative dilatability of the various portions is clearly shown in Fig. 1, which is drawn from a cast of the urethra taken in fusible metal immediately after death. The prostatic and bulbous parts are the most dilatable, then the penile and membranous. The meatus is not only the narrowest, but by far the most resistant. As will be seen later on, it is important to know precisely to what extent the several

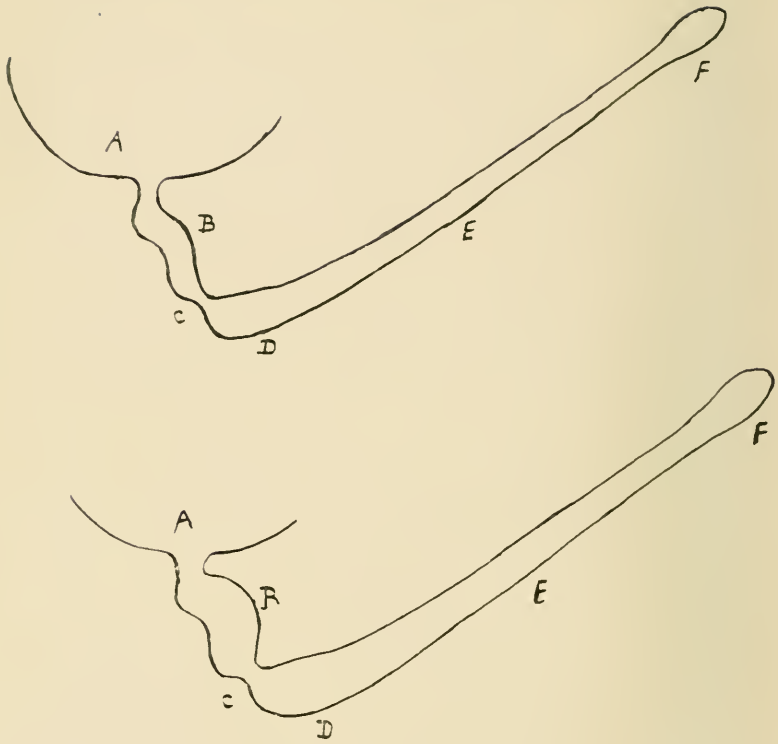

FIG. 1.

A, Fossa navicularis; B, penile portion; C, bulbous portion; D, membranous portion; E, prostatic portion.

portions of the normal urethra can be dilated. This is indicated in the following table:

			French Scale.*
The meatus ...	7 to 8 mm.	in diameter	= No. 21 to 24
Middle of penile ...	10	„ „	= No. 30
Bulbous portion ...	13 to 15	„ „	= No. 39 to 45.
Membranous portion	9 to 10	„ „	= No. 27 to 30.
Prostatic portion ...	13 to 15	„ „	= No. 39 to 45.

* *I.e.*, will admit a urethral instrument of this size. See p. 80.

2. The Muscular Fibres of the Urethra and Bladder.

Although it is convenient anatomically to divide the urethra into the several portions mentioned above (prostatic, membranous, bulbous, and penile), in practice

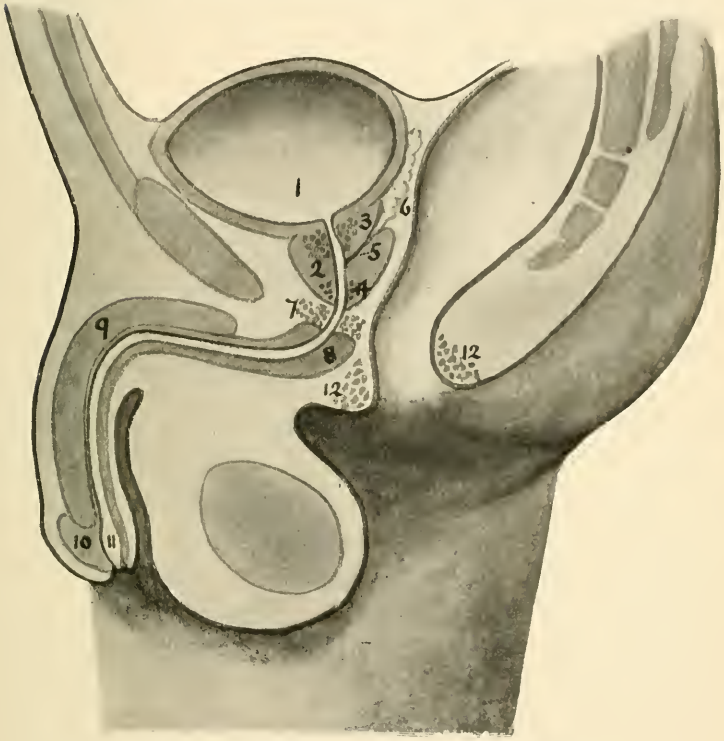

Fig. 2.—Diagrammatic Sketch of Urethra and Bladder.

1, Bladder; 2, prostate gland; 3, internal vesical or prostatic sphincter; 4, external vesical or prostatic sphincter; 5, ejaculatory duct; 6, seminal vesicle; 7, compressor urethræ muscle surrounding membranous urethra; 8, bulb of the corpus spongiosum; 9, corpus cavernosum; 10, glans penis; 11, fossa navicularis; 12, sphincter ani.

the canal may be advantageously divided into two portions, the *anterior* and *posterior*. This is no arbitrary division, but founded upon anatomical and physiological

reasons. The anterior portion comprises the penile and bulbous parts; the posterior the membranous and prostatic. Whilst the anterior portion is surrounded by erectile tissue, the posterior is enveloped by muscular fibres. Of these muscular fibres it is necessary to say a few words. Situated within the prostate and surrounding the vesical orifice there is an ill-defined ring of involuntary muscular fibres, intermixed with much elastic tissue. This ring is called the internal prostatic or vesical sphincter. The fibres of this muscle are so slender that it is believed by many authorities, including Finger, that its action can be but slight, and that it is therefore not sufficiently powerful to prevent the escape of the urine from the distended bladder. Within the prostate, below the internal prostatic sphincter, and separated from it by glandular tissue, there is another and more powerful ring of muscular fibres which surrounds the urethral canal. These fibres, chiefly of voluntary muscle, form the external prostatic or vesical sphincter. When the urethral canal leaves the apex of the prostate, it is still surrounded by a thick layer of voluntary muscular fibres, which is known as the compressor urethræ.

Thus both portions of the posterior urethra are surrounded by muscular tissue.

The muscular fibres in the prostatic and membranous portions are usually in a state of tonic contraction, which contraction can be markedly increased by an exercise of the will, but during the act of micturition is involuntarily relaxed.

According to Finger,* the bladder itself has no true sphincter of its own; it is therefore unable to prevent the escape of urine. This is accomplished by the action of the muscular fibres surrounding the posterior urethral

* 'Die Blennorrhöe Sexualorgane,' 1905, S. 38.

canal. When the bladder contains but little fluid, it forms a round ball-like structure, sharply defined from the prostate by the contracted internal prostatic sphincter (see Fig. 3). And it is not until the bladder has become distended that the pressure of urine causes the elasticity of the neck of the bladder and the internal prostatic

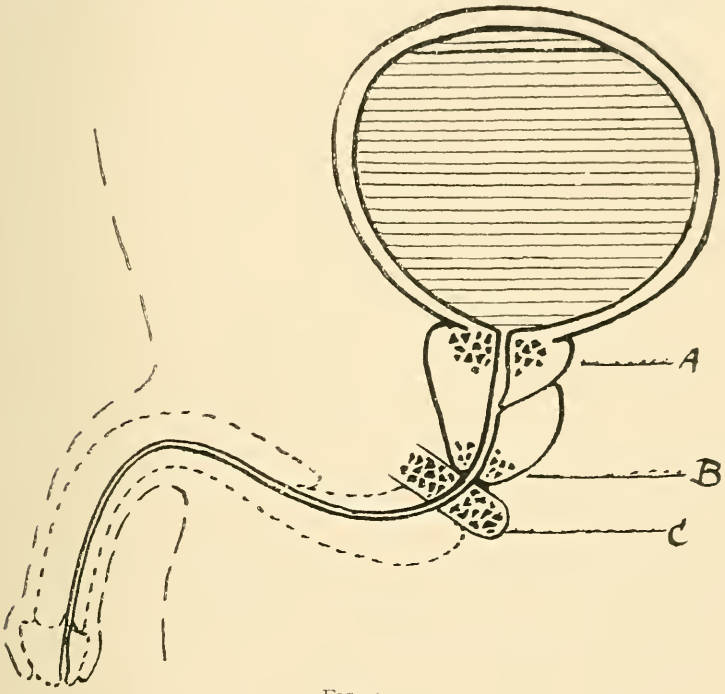

Fig. 3.

A, Internal vesical sphincter; B, external vesical sphincter; C, compressor urethræ.

sphincter to yield, thus allowing the fluid to enter the posterior portion of the prostatic urethra. When this takes place, the sharply-defined border between bladder and urethra is lost, and a 'bladder-neck' is formed (see Fig. 4).

When the first drop of urine enters the prostatic urethra

the desire to micturate is felt. This desire is provoked by the irritation of the mucous membrane of the prostatic urethra by the urine. By bringing into play the voluntary

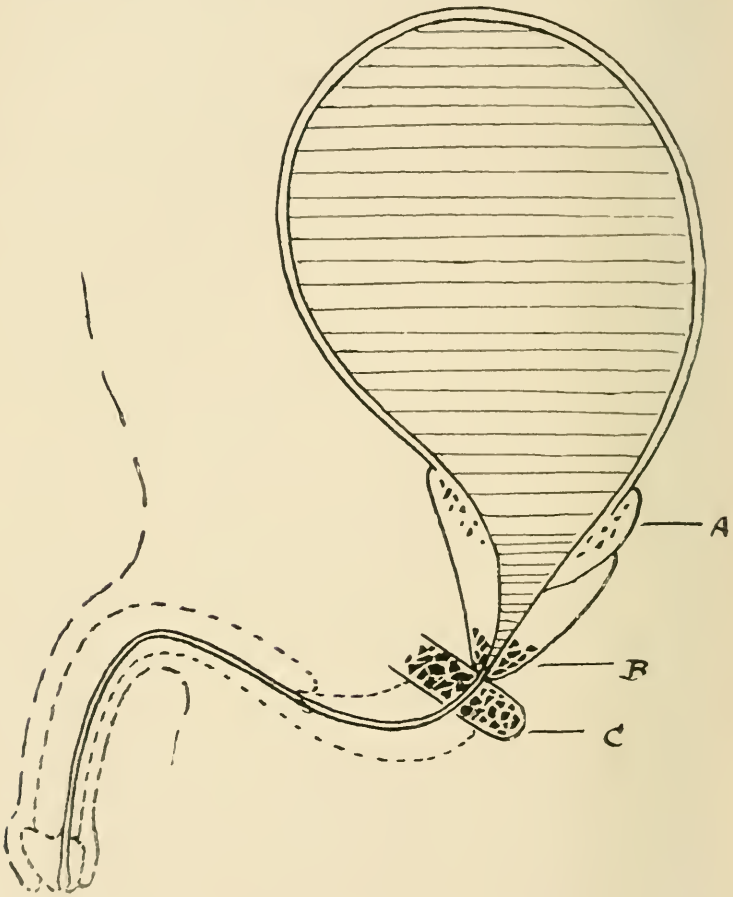

Fig. 4.
A, Internal vesical sphincter; B, external vesical sphincter; C, compressor urethræ.

muscles of the posterior urethra the escape of urine can, if desired, be prevented.

The further collection of urine takes place not only in

the distended bladder, but also in the now encroached upon prostatic urethra. Through this encroachment on the prostatic urethra by the bladder the urethra is appreciably shortened. This, Finger asserts, can readily be determined by passing a catheter along the urethra until the urine begins to flow, and noting how far the catheter has been introduced. When the bladder is moderately full, but no desire to micturate is present, the catheter may be passed from 18 to 21 centimetres before the urine will flow. But when the bladder is full enough to cause a desire to micturate, showing that the urine has entered the prostatic urethra, the flow will take place when the catheter has been passed from 16 to 19 centimetres.

From all this it would seem that when the bladder is either empty or but moderately distended it is closed by the internal prostatic sphincter ; when it is fully distended, this function is performed by the external prostatic sphincter and the compressor urethræ.

I have here given somewhat fully Finger's view of the action of the sphincter of the bladder, as it has been largely adopted, and affords a ready explanation of many of the phenomena met with in urethritis. There are, however, reasons for believing that the sphincter of the bladder (the internal prostatic sphincter) plays a far more important part than Finger and Guyon credit it with, and that under ordinary circumstances it is by this muscle that the bladder is closed whether distended or not. And there is evidence* that when the internal sphincter does

* M. v. Zeissl, 'Ueber die Innervation der Blase,' *Arch. f. d. ges. Physiolog.*, Bd. 53 ; 'Ueber die Innervation der Blase,' *Wiener Klinik*, 1901, Heft. 5 ; 'Weitere Untersuchungen über die Innervation der Blase und der Harnröhre,' *Arch. f. d. ges. Physiolog.*, Bd. 89, 1902. A. Hanc, 'Experimentelle Studien über den Reflexmechanismus der Hahnblase,' *Pflügers Arch. f. d. ges. Physiolog.*, Bd. 73. v. Frankl-Hochwart and Fröhlich, *Mendels Neurolog. Zentralbl.*, 1904, No. 14.

yield, it does so, not because it is overcome by the mechanical pressure of the urine in the bladder, but because its muscular fibres relax as a vital act in response to a nerve impulse preliminary to the evacuation of the urine.

The normal act of micturition would appear to be as follows: As the bladder becomes distended with urine the vesical nerves are stimulated, and evoke stronger and stronger contractions of the detrusor muscles, giving rise to the desire for micturition. To withstand the increased pressure of the urine, the tone of the internal unstriped muscular sphincter is increased, and, if necessary, even the accessory voluntary urethral muscles are called into play. When a favourable opportunity for micturition occurs, the internal sphincter is voluntarily relaxed, together with the rest of the unstriped muscular tissue of the posterior urethra, and the urine is expelled by the contraction of the detrusors.

The objection which has been raised to an unstriped muscle, like the internal sphincter, being under the influence of the will is fairly met by a reference to the accommodation muscle of the eye, which, whilst unstriped, is completely under the control of the will.

Finger, in support of the theory that as the bladder becomes distended the pressure of the urine causes the elasticity of the neck of the bladder and the internal sphincter to yield, and the urine to enter the posterior portion of the prostatic urethra, quotes certain experiments by Born,* who injected liquid plaster of Paris down the ureter of certain recently killed animals so as to distend the bladder. After a small quantity had been injected under slight pressure and had set, the cast of the bladder had the form of an egg, and was sharply cut off

* *Zeitschrift für Chirurgie*, Bd. 25, S. 135.

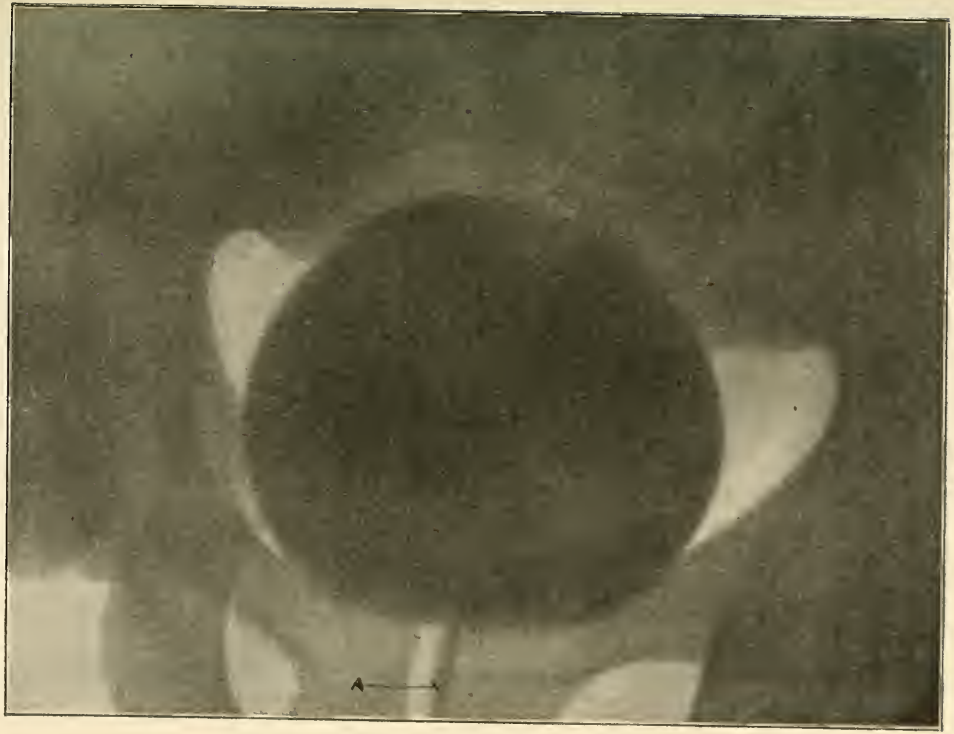

FIG. 5.—Radiograph of a fully-distended Bladder. A, Metal bougie lying in Urethra.

from the urethra by the internal sphincter. When a large quantity was injected under greater pressure the cast was pear-shaped, on account of the prostatic urethra having been taken up into the bladder so as to form a 'bladder-neck.'

These experiments on the dead bodies of animals are, however, so crude, and carried out under circumstances so totally unlike those met with during life, that no weight can be attached to their results. I have repeated this experiment under more natural conditions, and obtained very different results. I injected the bladders of certain men and youths with a suspension of bismuth, and then radiographed the pelvis. In every case I found that, whether the bladder was fully distended or not, the outline of the organ was oval and not pear-shaped, and the urethra was sharply cut off from the bladder without a suggestion of a 'bladder-neck,' as shown in Fig. 5, which was taken from a radiograph of the pelvis of a man whose bladder had been previously fully distended by the injection of a suspension of bismuth. A fine metal bougie has been passed into the bladder in order to show the position of the urethra. It would be out of place to discuss this question further here. I have treated it at greater length elsewhere.

Before turning from the anatomy of this part, it may be well to say a few words respecting the *compressor urethræ* muscle.

This muscle plays a very important part in the production of what is commonly called spasm of the urethra. If in a healthy person a simple bougie be passed, as the instrument enters the membranous portion the walls of the urethra contract, so as to grasp the bougie and somewhat hinder its progress towards the bladder. This arises from the bougie having stimulated the nerve-endings of

the mucous membrane, and brought about a contraction of the compressor urethræ muscle. When the urethra is inflamed, the slightest irritation to the mucous membrane, such as is caused by the passage of urine, may give rise to so violent a spasm of this muscle as to cause retention of urine. When the irritation is very great all the muscular fibres in and about the urethra are spasmodically contracted, but usually the spasm is limited to the compressor urethræ and the muscular fibres about the membranous urethra.

This spasmodic contraction may be called forth, not only by the passage of a foreign body like a bougie, but also by the pressure and irritation of fluids; and thus it happens that even an unirritating fluid injected up the healthy urethra is prevented from entering the membranous urethra by the contraction of the compressor muscle. Still more marked becomes the spasm when an astringent or irritating fluid is injected up an inflamed urethra. And thus it is that in the treatment of acute urethritis (to be presently considered) the injection is prevented from entering the membranous and prostatic portions of the urethra by a contraction of the compressor urethræ.

It is true that under an anæsthetic, or by the adoption of certain measures which will be referred to later, it is possible to fill the bladder by injecting fluid into the meatus. But this in no wise contradicts the established fact that *fluids injected with an ordinary gonorrhœal syringe do not usually pass beyond the bulbous urethra.*

Now, just as the compressor muscle prevents the passage of fluids to the bladder, so it prevents fluids from passing the opposite way, viz., from the bladder to the meatus.

Therefore, if pus or blood be present in the urethra behind the compressor muscle, the fluid will tend to pass

backwards into the bladder rather than forwards towards the meatus.

It will be seen that the compressor muscle thus sharply separates the urethra into two portions, an anterior and a posterior portion, which division is of the greatest importance for the proper understanding of the pathology, symptoms, and treatment of gonorrhœa.

CHAPTER III

ACUTE URETHRITIS

This disease arises from an inoculation of the urethral mucous membrane at the meatus with the specific virus—the gonococcus. The inoculation soon gives rise to an acute catarrhal inflammation, which spreads as far as the bulb, but not, under favourable circumstances, beyond it. If the inflammation spread beyond the bulb to the posterior urethra, this extension must be regarded as a distinct complication, which brings in its train new and unfavourable symptoms, and calls for a different mode of treatment. The extension of the inflammation is of frequent occurrence; how frequent it is difficult to say, for much depends on the way the disease has been treated, but, roughly speaking, in 80 per cent. of all cases of urethritis of over six weeks' duration the posterior urethra becomes infected.

Acute Anterior Urethritis.

Incubation. — A short period elapses between the inoculation of the urethral mucous membrane with the virus of the disease and the appearance of the first symptoms of the same. This period of incubation varies within certain limits. It may be as brief as one or two days only, or it may extend to two, or even three, weeks, but in three-fourths of the cases it is confined to the limits of one week. Most commonly the first symptoms are

noticed on the third or fourth day after infection. It very rarely occurs that the period of incubation is less than two days. Instances recorded as such are generally to be explained as exacerbations of latent chronic gonorrhœa, and not as fresh infections.

Symptoms.—Generally, the first symptom noticed by the patient is a slight burning or tingling sensation, felt at the end of the penis, especially on micturition. The lips of the meatus then become swollen, everted, and moistened with a slight tenacious, mucous secretion, which rapidly becomes copious and purulent. During the next few days the pain on micturition increases considerably, so much so that the patient dreads to make water. The discharge rapidly passes from clear mucus to muco-pus, and then to thick creamy yellow or greenish-yellow pus, which is secreted so profusely as to be constantly dropping from the meatus. As a rule, the penis is red and swollen, and the prepuce œdematous, so that the glans is uncovered with difficulty. Not unfrequently the lymphatics of the organ are inflamed, and appear as thin red streaks in the integuments of the penis; and the lymphatic glands of the groin are swollen and tender.

Distressing sexual symptoms are seldom absent, the inflammatory irritation of the parts inducing increased sexual desires. In the earliest stages of the disease this condition often provokes the patient to sexual excesses; but as the inflammation increases all voluptuous feelings are lost in the intense pain which an erection of the inflamed organ evokes. These painful erections, often accompanied by seminal emissions, form a characteristic feature of the acutest stage of the disorder, and seriously interfere with the night's rest and sleep.

The inflamed condition of the urethra and the corpus

spongiosum renders them less elastic than usual. Consequently, when the penis becomes swollen and erect, it curves downward to a greater or less degree, and the inflamed urethra can be felt as a cord holding down the penis, hence the term *chorda venerea*. These erections of the inflamed organ are naturally accompanied by severe pain, and in consequence are dreaded by the patient. At these times it not infrequently happens that the pus is tinged with blood, which has escaped from the engorged capillaries of the urethral mucous membrane.

Considering the severity of the local symptoms, it is surprising how little the general constitution is affected. Apart from a slight pallor of the face, loss of appetite, and feeling of malaise, the general condition is hardly impaired. During the acme of the inflammation a trifling rise of temperature may be noted, but rarely more than these effects are produced.

The symptoms generally increase in severity up to the second or third week; and then, if all goes well, a change for the better begins to take place. The inflammation slowly dies down, and the symptoms abate. The secretion becomes thinner, more mucoid, and lessened in quantity, until at length only sufficient remains to glue the lips of the meatus together. It then disappears, so that at the end of the fifth or sixth week the entire process is over, and the disease is cured.

This may be regarded as the normal and most favourable course, but it is liable to many exceptions. Apart from the occurrence of the special complications to which this disease is so peculiarly liable, and which are more conveniently discussed elsewhere, the course of the disorder may be affected in the following ways: (*a*) By an exacerbation or recurrence of the acute inflammation; (*b*) by an extension of the disease to the posterior urethra;

and (*c*) by the inflammation passing into a chronic condition. These we will consider separately.

An Exacerbation of the Acute Inflammation.

Little need be said on an exacerbation of the acute inflammation. It not infrequently arises from some indiscretion in diet, more especially in the use of alcohol, or by sexual excitement, or unsuitable local treatment. Such relapses may occur again and again. These not only greatly delay the recovery of the patient, but are often most potent factors in bringing about an extension of the inflammation to the posterior urethra, and in causing the disorder to become chronic.

CHAPTER IV

ACUTE POSTERIOR URETHRITIS

About the beginning of the third week the inflammation in the anterior portion of the urethra reaches its acme, and unless it extend further along the urethra, will either entirely disappear or gradually pass into the chronic stage. Should it, however, extend to the posterior urethra, the prognosis is considerably graver; the risk of such complications as epididymitis, cystitis, prostatitis, and spermato-cystitis being very great.

The frequency of the extension of the inflammation to the posterior urethra is variously estimated by different writers. This discrepancy arises from different tests being used to detect the extension, and also from the fact that this, like all other complications of this disease, varies according to the social position of the patient and his ability or inability to rest. But all authorities are agreed that it is a complication more frequently present than absent. Jadassohn (1889) detected it in 87·7 per cent. of all cases of urethritis of from four to six weeks' duration; Rona in 90 per cent.; Finger gives 63 per cent. for his private, and 82 per cent. for his hospital, cases.

The reason for the extension of the inflammation to the posterior urethra is not always easy to detect, but anything which tends to aggravate the disease, such as excessive

bodily exercise, venereal or alcoholic excess, or irritating injections during the early stages of the disorder, seem to be the most frequent causes.

It is not quite clear why the inflammation so frequently stops at the bulbous urethra. Guyon believes that the further extension of the inflammation is prevented by the action of the compressor urethræ. But it is difficult to understand how a muscle, however powerful, can stop the advance of a virulent catarrhal inflammation along an uninterrupted mucous membrane.

Finger thinks it is probably due to the fact that the gonococcus has a special tendency to develop most luxuriantly in glandular tissue, the infection spreading from follicle to follicle. Whilst the pendulous portion of the urethra is rich in follicles and also in numerous glands and crypts, increasingly so towards the bulbous urethra, the membranous portion is free from all follicles. These only appear again in the prostatic urethra, to cease at the vesical orifice. Finger suggests this as an explanation of the tendency of the inflammation to be arrested at the beginning of the membranous urethra and again at the orifice of the bladder. A more simple explanation would be to regard the extent to which the inflammation spreads as merely dependent upon the virulence of the infection and the degree of resistance offered by the tissues.

Symptoms.—The extension of the inflammation to the posterior urethra may manifest itself by the sudden onset of painful symptoms, or it may develop so insidiously as hardly to attract the notice of the patient. The most frequent and by far the most distressing symptom is an excessive irritability of the prostatic mucous membrane, causing *a constant desire to micturate*. The intensity of this symptom is proportionate to the degree of inflammation. In the acutest cases the desire to micturate scarcely

ever abates, and is independent of the amount of urine in the bladder.

Another common symptom is *hæmaturia*. The last few drops of urine and pus are stained with blood, which has been pressed out of the inflamed mucous membrane of the membranous portion by the contraction of the compressor urethræ. As a rule, the bleeding is limited to a few drops of bright blood passed at the end of micturition, but at times the hæmorrhage is free. This, unfortunately, often leads to an entirely erroneous diagnosis, and the unhappy patient is subjected to an instrumental examination of the bladder.

A third symptom of this condition is that of *frequent seminal emissions*. This symptom, which is seldom absent, is due to the irritation of the caput gallinaginis. Its occurrence during the third or fourth week of an attack of acute gonorrhœa should cause the surgeon to suspect the presence of posterior urethritis.

In addition to these three cardinal local symptoms, there is usually some constitutional disturbance, slight fever, and a decided feeling of malaise.

In a considerable proportion of cases of posterior urethritis the urine, though filtered free from pus cells, etc., shows the presence of albumin when tested by boiling or by the addition of nitric acid. The amount of albumin is out of all proportion to the quantity of pus present, and cannot be explained on the supposition that it represents the albumin of the serum or liquor puris. If the urine from a case of acute anterior urethritis be filtered, the filtrate scarcely shows the presence of albumin, notwithstanding the large amount of pus present in the urine. No satisfactory explanation of this albuminuria has been given, but its presence is an unfavourable sign, and calls for special care in the application of local remedies. The

origin of this albuminuria is doubtful. Finger and Nischkovsky maintain that it is closely associated with the vesical tenesmus, increasing and decreasing *pari passu* with this condition. This statement is not in accordance with my own observations. Runeberg and Ultzmann believe that it arises from the back pressure of the urine in the ureters in consequence of the spasm of the vesical sphincter.

Unfortunately for the patient, an acute posterior urethritis is often but a prelude to further and more serious complications. The most common of these is an epididymitis produced by the inflammation extending up the ejaculatory ducts. Less commonly the vesicles are infected in like manner. Again, just as the inflammation may spread from the anterior to the posterior portion of the urethra, so may an acute posterior urethritis give rise to a cystitis.

Diagnosis.—The easiest, and in most cases the best, way of proving the presence or absence of posterior urethritis is by means of the 'two-glass test' of Sir Henry Thompson. It is applied in the following manner: The patient on first rising in the morning passes his urine into two urinary glasses, half emptying his bladder into one glass, and then passing the remainder into the second glass. Should he be suffering from anterior urethritis, the urine in the first glass will appear turbid from the presence of pus, which the flow of urine has brought away; but the second portion of urine will be quite clear, for the urethra has been swept free of pus by the first portion passed. But if it be a case of posterior urethritis, not only will the first portion of urine be turbid, but the second also. It is obvious that this turbidity of the second portion can only be due to a turbidity of the urine within the bladder. As the first portion of urine

passed removes all the pus from the urethra, if the urine within the bladder be clear, the second portion must be clear also. The pus in the anterior urethra is prevented from passing backwards by the strong compressor urethræ muscle, but it is free to pass forwards, and is, indeed, aided by gravity. But it is different with the pus found in the posterior urethra. Here the compressor muscle prevents it passing forwards; it is free, however, to pass backwards into the bladder, where it mixes with the urine collected there. Finger believes that the passing of the pus backwards into the bladder is aided in that, as this organ becomes distended it encroaches upon the prostatic urethra, and thus promotes the mixing of the pus with the urine. The drawing up of the prostatic urethra into the bladder, if it occurs at all—and we have given reasons for doubting it (see p. 12)—does so when the bladder is distended, as usually occurs during the night. When pus has made its way into the bladder it settles to the bottom of that organ, the urine collecting above. When the urine is first passed in the morning both portions are turbid, as a rule the first being the more turbid. But if the urine be tested in the same way as described above during the day, when the urine is not retained for so long a period as during the night, it frequently happens that the second portion of urine is quite, or almost, clear.

This difference in the turbidity of the second portion of urine according to the time of the day is one of the chief diagnostic signs of posterior urethritis, and distinguishes it from cystitis, in which the turbidity of the urine is constant, and the second portion thicker than the first. Hence the importance of the rule, *when testing for the presence of posterior urethritis, to examine the urine first passed on rising.*

Jadassohn's Three-urine-glass Test.—At times there is an advantage in making use of three urine glasses in the way suggested by Jadassohn. The patient having passed the greater part of his urine into the first and second glasses, passes the last portion into the third glass. The first glass will then contain any pus or secretion which was present in the urethra. The second glass will contain urine turbid with pus if any should have been regurgitated into the bladder. The third glass collects the last portion of urine from the fundus of the bladder, plus any blood, pus, or secretion which the powerful contraction of the compressor urethræ may squeeze out of the prostatic gland. This three-glass test is principally used in the differential diagnosis of posterior urethritis and that of cystitis. Should cystitis be present, the urine passed into the third glass will usually be more turbid than that in the first and second glasses.

Kollmann's Five-glass Test.—Kollmann uses a five-glass test. The principle of the procedure is to thoroughly cleanse the anterior urethra, and then to allow the patient to urinate into three glasses. A catheter of hard rubber with the eye closed to the end is passed into the bulbous urethra, and with this, using a 6-ounce syringe, the anterior urethra is thoroughly washed out, and the washings collected in the first urine glass. The irrigation is carried on until the escaping fluid of the last irrigation is free from shreds and mucus. When it is certain that all shreds have been removed from the anterior urethra, the fluid of the last irrigation is collected in the second urine glass, the so-called 'control glass.' The patient then micturates successively into three classes—viz., glasses Nos. 3, 4, and 5. The contents of these glasses are interpreted as in Jadassohn's three-glass test.

	Acute Anterior Urethritis.	Acute Posterior Urethritis.	Cystitis.
Two-urine-glass test	First portion cloudy Second portion clear	First portion cloudy Second portion cloudy, though less so than first portion *	First portion cloudy Second portion always cloudy, generally more so than the first portion
Three-glass test	First portion cloudy Second portion clear Third portion clear	First portion cloudy Second: Generally cloudy, though less so than first portion Third: Generally cloudy, though less so than first portion	First portion cloudy Second portion cloudy Third portion more cloudy than first and second portions

Although usually sufficient pus is formed in the posterior urethra to regurgitate at some time or other of the day into the bladder, occasionally the amount produced is too small to do so. In these cases the first portion of urine will carry away all the pus from the whole of the urethra, and the second portion will consequently be clear. Therefore the constant absence of turbidity in the second portion of urine does not positively exclude the presence of posterior urethritis, although it is strong presumptive evidence in favour of its absence.

The best way of determining the presence or absence of posterior urethritis, in case of doubt, is to wash the anterior urethra free from all secretion before the patient passes water. If the urine after this contains pus, it must have come from the posterior portion.

The performance of this manœuvre requires some little care. An elastic catheter is passed down the urethra as far as the bulb, and then under gentle pressure the anterior

* The second portion is not always cloudy, but varies, sometimes cloudy, sometimes clear.

urethra is irrigated with boracic solution. The fluid, prevented by the compressor urethræ from passing beyond it, escapes at the meatus, carrying with it any secretion lodged in the anterior portion. The irrigating fluid should be cold, so that it may cause a more active contraction of the compressor muscle. The irrigation is continued till the boracic solution returns quite clear and free from all secretion. As the fluid escapes from the meatus it is collected in a glass for comparison with the urine subsequently passed.

Care must be taken that the fluid be not injected too forcibly, lest the resistance of the compressor be overcome and the test be nullified. A ready means of determining whether the fluid has passed into the posterior urethra or not is to irrigate with solution of iodide of potassium (1 : 1000) instead of the boracic fluid. Then, the patient having micturated, add to the urine a drop or two of perchloride of iron solution. If the fluid has been forced into the posterior urethra, a characteristic blue colour will be produced, showing that the irrigation has not been properly performed (Lohnstein).

In discussing the diagnostic value of the tests by two, three, and five glasses, it has been assumed that the turbidity of the urine was due to the presence of pus or mucus, and not to other causes. In practice this point must be determined by a microscopical and chemical examination of the urinary deposit. For not infrequently the urine of patients suffering from gonorrhœa is cloudy from the presence of phosphates. A much rarer cause of the urine appearing turbid is the presence of large numbers of micro-organisms, more especially of the coli group. In the first case a few drops of dilute acetic acid added to the urine will at once dissolve the phosphates and render the urine clear ; in the second case, a microscopical examination reveals the cause of the turbidity.

CHAPTER V

THE BACTERIOLOGICAL DIAGNOSIS OF GONORRHŒA

Before making a prognosis or deciding on a line of treatment in a case of urethritis, it is necessary to determine whether the inflammation present is due to gonorrhœa or not.

Although gonorrhœa is responsible for the great majority of cases of urethritis, it is beyond dispute that occasionally other causes may give rise to this malady. The chief of these causes are: (*a*) Mechanical irritation, such as the passage of a rough urinary calculus; and (*b*) chemical irritation, such as would be produced by the intra-urethral injection of an irritating fluid.

The inflammation, which is the result of mechanical or chemical irritation, differs so markedly from gonorrhœa, however, that, even in the absence of all history of the case, there is little likelihood of the two conditions being confused. The inflammation caused by traumatic or chemical agencies develops immediately after the receipt of the injury, and so, unlike gonorrhœa, is devoid of an incubative period. Moreover, the inflammation rapidly attains its acme, generally within the space of a few hours, and as quickly subsides; and, further, it has no tendency to spread along the urethra or to become chronic. All this is typically represented by the inflammation provoked by the injection of a strong solution of nitrate of

silver. But, apart from the above-mentioned causes, a purulent urethritis may be produced by an inoculation of the urethra with micro-organisms other than the gonococcus. The ordinary micro-organisms of sepsis seem capable, under certain conditions, of producing a mild purulent condition. This is a probable explanation of those rare cases in which a purulent discharge has developed in a healthy man after coitus with a healthy menstruating woman, or one suffering from leucorrhœa of non-specific origin. That such an infection may take place seems well established. The majority of the reported cases, however, are probably examples of latent chronic gonorrhœa, acquired perhaps long before, which has been rekindled by sexual or other stimuli. But on this point more will be said subsequently. Although the bacteriology of this pseudo-gonorrhœa has attracted much attention, there is but little uniformity in the statements as to the micro-organisms found to be present. Apart from the common pus cocci, a short, slender bacillus and a diplococcus have been commonly described. But there is no reason to suppose that either of these plays a specific rôle.

The bacteriological diagnosis of gonorrhœa rests upon the detection of the specific micro-organism, the gonococcus, within the pus. In the acute stage of the disease the cocci are present in such large numbers that their detection is one of the easiest of bacteriological tasks. All that is necessary is to smear a drop of the urethral pus upon a clean glass slide, dry it gently with heat, and then stain it for a minute or two with an alkaline solution of methylene blue. The stain is then washed off with water and the slide allowed to dry. A drop of cedar oil is now placed on the stained film (a cover-slip is unnecessary), and the slide examined with a $\frac{1}{12}$-inch oil-immersion

objective. It will be noticed that the pus cells have become faintly stained with the blue, and the large irregular nuclei more deeply so; and within the body of the pus cells the cocci will be found stained a still deeper —a dark blue (Fig. 6). The gonococci are almost always seen in pairs, hence the term 'diplococcus.' They are further grouped together in fours or multiples of four. They never form chains. The gonococcus is similar in

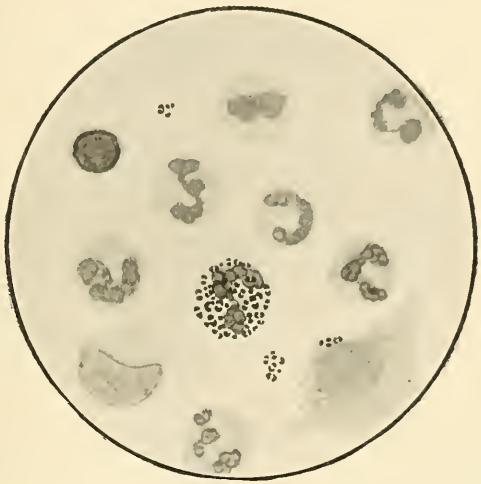

Fig. 6.—Acute Gonorrhœal Pus, showing Gonococci; Pus Cells with Irregular Nuclei. (×1,000.)

shape to a bean, the concavities of the twin cocci being opposite to each other. The grouping of the cocci arises from the method of multiplication, which is by fission. The beginning of the fission is indicated by the concavity. The line of fission in each pair is at right angles to that of the previous pair, whence the tendency to the formation of groups of four and multiples of four (see Fig. 7).

The staining of the pus with methylene blue, as described above, is in most cases the simplest and best

method of demonstrating the presence of gonococci. Numerous other stains have been advocated from time to time as superior, but, after a careful trial of them, I find that there is little to recommend them save their novelty. No method has hitherto been discovered by which the gonococci can be differentially stained from the other micro-organisms; and, short of this, there seems little to be gained by fancifully staining the pus cells.

Of the double stains suggested, that of Lanz* may be specially recommended. It is composed of 4 parts of a saturated solution of thionin made in 2½ per cent. carbolic

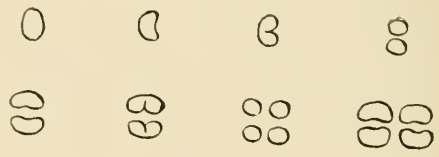

Fig. 7.—Diagrammatic Representation of the Multiplication of the Gonococcus.

water, together with 1 part of a similar solution of fuchsin. The stain is used in the following manner: The dried film of pus is immersed in the mixture from fifteen to thirty seconds, then washed in water, dried, and mounted. The gonococci are stained blue by the thionin, and the pus cells red, with their nuclei bluish-red.

The gonococcus, unlike the majority of the pathogenic cocci, does not retain Gram's stain.† This fact is largely

* *Deutsch. med. Woch.*, 1898, No. 40.

† *Gram's Stain.*—(*a*) After drying and fixing the film, stain for five minutes with strong anilin-gentian-violet solution. (*b*) Without washing, treat with Gram's iodine solution for two minutes (iodine 1, iodide of potassium 2, distilled water 300). (*c*) Decolourize in absolute alcohol until no more violet colour is seen to come away.

made use of in the forming of a differential diagnosis. It must, however, be borne in mind that Gram's staining reaction is not an infallible test, and, therefore, too much reliance must not be placed upon it.

The gonococcus does not grow readily under artificial conditions. On ordinary media, such as gelatine or agar, it will not grow at all, and even when special media on which it will grow are used, the growth is never luxuriant, and it quickly ceases. The simplest method of cultivating it for clinical purposes is to smear a drop of fresh human blood or serum over the surface of a sloped agar tube,* and to inoculate the thus prepared surface with a drop of pus squeezed out of the deeper portion of the urethra. A better culture-medium, when available, is made by mixing 1 part of human serum (hydrocele fluid may be used) with two parts of the ordinary peptone-agar medium. The tube is then incubated at a temperature of 37° C. At the end of twenty-four hours the colonies of the cocci look like fine drops of dew dotted on the surface of the agar. At the end of three days they cease to grow, and soon afterwards die. In selecting gonorrhœal pus for examination it is always well to avoid that found at the meatus, as it is likely to be contaminated with other micro-organisms. Inoculation experiments cannot be conducted upon animals, they being immune to the gonococcus. But it has been proved that the gonococcus is the true cause of gonorrhœa by successfully inoculating the urethra and conjunctiva in the human subject.†

The bacteriological diagnosis of gonorrhœa is often of great value, more especially in medico-legal cases, and, as we shall see later, in forming a decision as to the definite cure of the chronic condition. In the acute

* Abel, *Deutsch. med. Woch.*, 1893.

† Bumm, Wertheim, Finger, and others.

stages of purulent urethritis there is rarely any difficulty in definitely determining the presence or absence of the gonococcus. All that is necessary is the microscopical examination of a stained film of the pus. It is, however, to be remembered that the gonococci are not evenly distributed throughout the pus; therefore several films should be prepared, and no antiseptic injection should have been made for some hours prior to the examination. Should no gonococci be found on the first examination, the search should be repeated on the following day, when, if they are still absent, it may be safely concluded that the case is not one of gonorrhœa. *This, however, applies only to acute urethritis.* In the chronic condition the gonococci are met with in sparing numbers, and may be entirely absent from the secretion for days together. Moreover, their appearance is by no means so characteristic as in the acute stage, for the cocci are no longer found within the body of the pus cells, but free, or adhering to the surface of epithelial cells. Hence their detection may require considerable bacteriological experience.

Should cocci be detected in the secretion, it is seldom difficult to pronounce positively whether they are or are not gonococci. The chief points on which this diagnosis is based are the following:

(*a*) The presence of a kidney-shaped diplococcus in groups of four or multiples of four;

(*b*) The situation of the coccus within the body of the pus cell;

(*c*) The non-retention by the coccus of Gram's stain; and

(*d*) The failure of the coccus to grow on ordinary gelatine or agar.

A point of considerable medico-legal and social importance is the fact that the gonococcus may retain its

vitality for some considerable time in pus, for though the gonococcus has but little power of resistance against heat, dryness, or antiseptics, it may nevertheless live for several days in the thick purulent secretion.*

* Heiman, *New York Medical Record*, June, 1895, and December, 1896.

CHAPTER VI

THE MORBID CHANGES IN THE URETHRAL SECRETION AND MUCOUS MEMBRANE

It may be remarked that the nature and amount of a urethral secretion is generally better appreciated by an examination of the urine than by inspecting the secretion as it exudes from the meatus. This especially applies to the chronic condition of the disease; indeed, as we shall see later, it often happens that the only sign of a chronic urethritis is the appearance of the urine. Moreover, by the means suggested we are enabled to ascertain whether it is a case of gonorrhœa or not without the patient being asked a single question or being aware of our suspicion. The importance of this when dealing with women or with men of a sensitive nature will be readily appreciated. In the earliest stage of the disease, if the urine (and preferably the morning urine, for reasons which have been explained) be passed into a conical urinary glass, it will be noticed that floating in the clear fluid there are a few gelatinous thread-like bodies, which, if examined with the microscope, are seen to be composed of pus and epithelial cells, held together by mucin. They are formed by the urinary stream detaching and rolling up the thin tenacious secretion produced by the inflamed mucous membrane. These filaments are known as 'urethral threads.'

As the disease advances the urine will no longer appear

clear, but cloudy, from the presence of mucus. The cloudiness then gives place to a milky turbidity, due to the increasing number of pus cells present. If the urine be allowed to stand a few minutes the pus cells will sink to the bottom of the glass, forming a thick creamy sediment, over which will be seen a light cloudy deposit of mucus. In the further progress of the disease the layer of pus increases in amount, whilst the mucus diminishes. When the disease has reached its acme little but pus is seen. As the disease abates, all these conditions are reproduced in an inverse order. First the pus layer gradually diminishes in quantity, the mucus proportionately increasing; the mucus then disappears, and in the clear urine the urethral threads are seen floating; finally these disappear, and the disease is at an end.

Much useful information may be obtained from a careful microscopical examination of the secretion, apart from the question as to the presence or absence of the gonococcus. If the secretion be examined in the earliest stages of the disease, it will be noticed that the principal cells present are not leucocytes, but large squamous epithelial cells; gonococci are numerous, and are met with both free and in the pus cells (Fig. 8). As the inflammation increases in severity, the leucocytes and gonococci become more and more numerous, the epithelial cells being less frequently seen. The pus cells then become crowded with the cocci and gradually degenerate. When the acme of the disease is over and the pus changes to a muco-purulent secretion, it will be found that the epithelial cells reappear again mingled with the leucocytes. The gonococci are still present, both free and in the pus cells, though in smaller numbers; but they are not seen within the epithelial cells, though often covering their surface.

In the latest stage of the disease both the leucocytes

and gonococci are met with but sparingly, the urethral threads showing the presence of transitional epithelial cells, with few pus cells and cocci. An attempt has been made to found the prognosis upon the relation of the gonococci to the leucocytes. It was thought that the finding of many extracellular cocci was of evil import, betokening a specially severe attack; and, on the other hand, that where the cocci were largely or wholly intracellular the prognosis was particularly favourable.*

Fig. 8.—Urethral Secretion in the Earliest Stage of Acute Gonorrhœa. (× 1,000.)

Lanz† has, however, shown that the position of the cocci depends upon the manner in which the pus is obtained. If it flow freely out of the urethra, most of the cocci are within the leucocytes; but if the last drops of pus be squeezed out of the urethra by firm pressure, or are removed by scraping the mucous membrane, they then always contain large numbers of extra-cellular cocci. This accords with my own observations.

The position of the gonococci with respect to the leuco-

* Podres, 1885; Drobny, 1898.

† Lanz, *Arch. für Dermatologie und Syphilis*, Bd. 52.

cytes would seem, therefore, to have no importance in prognosis, though it may be remarked that the presence of a large number of leucocytes and gonococci betokens a virulent infection, and therefore is an unfavourable sign; but where few cocci and pus cells are seen, it may be surmised that the infection is mild and the course likely to be favourable. But before any such conclusion is drawn it is essential that a considerable number of stained films be examined.

Eosinophile Cells.—If the films of pus, after being stained with methylene blue, be counter-stained with eosin—a method which has much to recommend it—it will be found that, whilst the cocci and nuclei of the pus cells are coloured blue, the protoplasm of the latter is faintly tinged pink by the eosin. On close examination it will be seen that the granules of some of the leucocytes are deeply stained with eosin. Those cells the granules of which have a special avidity for eosin have been termed 'eosinophile' cells.

It is asserted that where the posterior urethra is affected—*i.e.*, where the inflammation is of a more virulent type—these eosinophile cells are markedly increased in number, and therefore are to be regarded as of unfavourable import.* But my observations upon this point do not lead me to confirm this statement. I propose, however, to discuss the question subsequently.

It may be convenient here to note briefly the changes that take place in the urethral mucous membrane in the progress of the disorder. As is well known, the male urethra is lined with stratified epithelium, the superficial cells of which are cylindrical, save at the meatus and in

* Bettman, *Arch. für Dermatologie und Syphilis*, Bd. 39; *Munich. med. Woch.*, 1898; Finger, 'Die Blennorrhœ de Sexualorgane,' 1905, pp. 93 and 94; Pezzoli, *Arch. für Dermatologie und Syphilis*, Bd. 35.

the fossa navicularis, where they are squamous. Outside the mucous membrane there is a layer of subepithelial connective tissue in which run numerous bloodvessels, and external to that a layer of involuntary muscular fibres, separating the former layer from the proper substance of the spongy body.

The mucous membrane of the urethra is furnished throughout, except just at the meatus, with numerous small acinous mucous glands and follicles, which are called the glands of Littré. The ducts of these glands open either directly on to the surface of the mucous membrane or into the lumen of the lacunæ of Morgagni. These lacunæ are small recesses in the mucous membrane, which open by oblique orifices pointing forwards. They are met with almost wholly in the upper wall of the penile urethra, and are from fifteen to twenty in number. The orifice of a lacuna is just large enough to occasionally catch the point of a fine catheter.

The stratified squamous epithelium in the fossa navicularis seems to offer a certain resistance to the gonococci, for they are only met with on the surface of the epithelium. In other parts of the urethra the cocci rapidly penetrate by the interepithelial spaces to the deeper cells of the epithelium and to the connective tissue beneath. In consequence of this invasion the epithelial cells become loosened, undergo mucoid degeneration, and are thrown off. The toxine produced by the micro-organism irritates and inflames the mucous membrane of the urethra, the bloodvessels dilate, and through their walls a constant stream of serum and leucocytes passes towards the surface. Thus at this stage there are two opposite streams—one of cocci, making their way from the surface to the subepithelial tissue, and another of serum and leucocytes, passing from the deeper layers towards the surface.

The gonococci are taken up by the leucocytes; but, notwithstanding much study of the subject, the relation of the gonococci to the leucocytes is still obscure. It is uncertain whether the cocci invade the passive pus cells or are attacked by the leucocytes, as suggested by Metschnikoff. The latter seems the more probable, but it is strange that the cocci do not appear to be adversely affected by their situation within their host. They apparently undergo no change, either morphologically or biologically. It is indeed believed by Bumm, Henke, and others that the gonococci multiply within the cell-body. If this were so, we should expect the leucocytes to show signs of degeneration; but they do not. As the leucocytes make their way towards the surface they convey the cocci from the deeper parts. Thus the penetration of the cocci towards the deeper structures is actively resisted by the stream of leucocytes passing outwards, in consequence of which, after a longer or shorter time, all the cocci are removed from the deeper parts.

According to Finger, to whom we are indebted for much of our knowledge on this subject, this normally occurs at or about the third week. When this is accomplished the acutest stage of the disease is passed, and the inflammation begins to subside. The denuded epithelium commences to degenerate, and at the same time undergoes a curious metaplasia, a stratified squamous epithelium being developed in place of the columnar epithelium. The gonococci are now found only on the surface of the epithelium, where they continue to irritate and inflame the membrane; but should the disease run a favourable course, the number of cocci steadily diminishes and the inflammation subsides. Frequently, however, the favourable course of the disease is interrupted by an exacerbation of the inflammation, provoked, perhaps, by some indiscretion in

food, more especially in the use of alcohol, or by sexual excitement, causing an acute hyperæmia of the mucous membrane. The hyperæmia produces a greatly increased flow of serum and migration of leucocytes; the epithelium is loosened and detached, and through the cell spaces the gonococci again penetrate, to provoke afresh all the symptoms of the acutest stage.

Such relapses may occur again and again, but each time the reaction diminishes. The mucous membrane gradually becomes indifferent to the toxine, and responds less and less to its stimulus. The consequence is that, after several repetitions of this process, the reaction is insufficient to eliminate all the cocci from the deeper parts of the membrane, and those cocci which are left in the deeper layers of the mucous membrane produce a slight, but constant, irritation, which provokes a proliferation of the connective-tissue cells, forming the so-called small-celled infiltration. This proliferation of the connective-tissue cells marks the onset of the chronic stage.

It is of much practical importance to observe that the inflammation, even in its acutest stages, does not affect equally all portions of the mucous membrane. It is in and around the various mucous glands of the urethra that the inflammation is the acutest, and it is there that it lingers long after the other parts have recovered.

CHAPTER VII

THE TREATMENT OF ACUTE URETHRITIS

NOTWITHSTANDING the interest which the disease has always awakened, evidenced by the extended literature on the subject, there is perhaps hardly any disorder treated so empirically and irrationally. How frequently the surgeon, armed with one or two favourite injection formulæ, prescribes them forthwith to the unfortunate patient, irrespective of the nature of the urethritis, the stage of the disease, the extent of the mucous membrane involved, and the presence or absence of complications! It is little to be wondered at that so blind a shot should so frequently miss. In order to treat the disease rationally, it is necessary to determine—(*a*) whether it is a case of gonorrhœa or pseudo-gonorrhœa; (*b*) the stage of the disorder; (*c*) the extent to which the mucous membrane is affected; and (*d*) the presence or absence of complications. It is only when all these particulars have been ascertained that one is in a position to prescribe for the patient with precision.

The treatment of gonorrhœa may be conveniently discussed under three heads: (1) Diet and hygiene; (2) internal remedies; (3) local applications.

1. **Dietetic and Hygienic Measures.**—The importance of this part of the treatment is so fully recognised that it is unnecessary to dwell upon it at any length. Experience

has abundantly proved the necessity of so regulating the patient's habits as to obtain the greatest amount of rest for the parts concerned, and the avoidance of frequent changes in the local blood supply. Everything which is likely to even temporarily increase the hyperæmia of the urethra is to be as far as possible avoided. It is with this object in view that the patient is placed on a light and easily-digested diet, and forbidden to take alcohol in any form, or to indulge in violent exercises, such as riding, cycling, etc. He must be also warned that the slightest sexual excitement is in the highest degree injurious, and is a frequent cause of retarded recovery. And energetic measures must be taken if necessary to combat the tendency to protracted erections and nocturnal seminal emissions.

The patient must be instructed to rest as much as possible. It should be clearly pointed out to him that the disease, so far from being the trivial malady it is commonly supposed to be, is a most serious disorder in itself, and is liable to still more serious complications, which it is of the utmost importance to avoid. It cannot be too strongly urged upon him that the most effective way of avoiding these complications is for him to remain in bed during the early stages of the disease. It is to be regretted that this complete rest in bed is not more frequently enjoined, for there is, I believe, no measure that can be prescribed more efficacious in shortening the duration of the disease, and avoiding its to-be-dreaded complications. It is true that often the desire to keep secret the nature of the disease makes it difficult to follow this advice; but when its importance is appreciated the difficulties can be generally circumvented.

Where it is impossible for the patient to remain in bed, the genitals should be supported by a well-fitting sus-

pensory bandage, care being taken that the same does not press unduly upon the penis or perineum. Some arrangement should be contrived for the absorption of the free purulent urethral discharge. It is not a good plan to insert cotton-wool under the prepuce, as is so frequently advised, it being apt to hinder the free flow of the pus. A better method is to place the penis in a little absorbent wool bag, such as is supplied by Hartmann's Wood-wool Company.

2. **Internal Remedies.** — Although numerous drugs have been advocated from time to time as of value in the treatment of this disease, there are remarkably few which have stood the test of time. Almost the only remedies which have proved themselves of decided value are certain of the balsams, of which many kinds are used; but of all of these sandal-wood oil is the best. Copaiva, which is also largely used, possesses no advantages, and it is decidedly irritating to the stomach and kidneys. Although there is no doubt as to the value of these balsams, they rarely seem able to completely cure the disease, and are accordingly to be used only as adjuncts to the local treatment. They should be given in the earliest stage of the disorder. They are of special value in those florid cases where all local treatment is contra-indicated by reason of the presence of pain and irritation. These balsamic remedies when taken by the mouth are excreted more or less unchanged in the urine, and act as a local stimulant and antiseptic to the inflamed mucous membrane. Urotropin, from which much was at one time hoped, has not proved of signal value in pure gonorrhœal urethritis, but it may be used with advantage in certain cases of mixed infection of both bladder and urethra.

3. **Local Applications.** — Local remedies have always played a large part in the treatment of urethritis. and

more especially since the microbic origin of the disease was determined; and there can be no question that the application of remedies directly to the affected part is both rational and highly successful; for though by means of dietetic and hygienic measures and the administration of balsams the disease can be greatly modified, yet these measures are rarely sufficient, apart from local applications, to bring about a complete cure.

Notwithstanding the number of local remedies now in use is very great, and is being continually increased, yet it must be regretfully acknowledged that up to the present time no panacea for this disease has been discovered. Some of the newer remedies, as we shall see, are of great value, and offer certain advantages over the earlier ones. But they all fall far short of fulfilling the requirements of a specific remedy for all stages of the disease.

In estimating the value of a remedy the following facts should be borne in mind: (*a*) That gonorrhœa, like most diseases in the absence of aggravating circumstances, naturally tends to recovery; (*b*) that almost all the local remedies in use are of an astringent character, and therefore arrest the secretion of the pus, leading the patient to suppose himself cured; and (*c*) that very close observation is required in order to determine that a cure has been effected.

The ideal remedy should fulfil the following conditions: (*a*) It must be able rapidly to destroy or remove the virus, the gonococcus; (*b*) it must do this without injuring the mucous membrane; and (*c*) it must allay the existing inflammation. It might be supposed that from the large number of known antiseptics it would be easy to find several that would fulfil these requirements. Such supposition, however, is baseless. The majority of the antiseptics that are capable of destroying the micro-organisms

are distinctly irritating to the tissues, and would thereby contravene the second condition required. Again, too much must not be expected from the action of antiseptics. For it is to be remembered that the cocci are to a great extent situated in and below the mucous membrane, and are especially hidden in the numerous crypts and follicles of the urethra in situations where it is impossible for the antiseptic fluid to reach them. Now, although many of the antiseptics in common use are able, even in dilute solutions, readily to destroy the gonococcus when brought *directly* into contact with it, yet otherwise they are powerless to affect it.

Again, almost all the antiseptics have the property of causing a coagulation of the albumen they may come into contact with. This seriously impairs their efficiency, for it both prevents the penetration of the antiseptics into the deeper tissues, and it naturally diminishes the bactericidal property of the chemical. Deductions drawn from laboratory experiments on the efficiency of antiseptics in destroying micro-organisms are apt to prove most fallacious when applied clinically.

It is highly probable that the beneficial effects of antiseptic urethral injections are due far less to the bactericidal action of the chemical than to its power of inhibiting the development of the micro-organisms by so affecting the mucous membrane as to render it a less favourable medium for the growth of the coccus.

If from the mass of suggested remedies we select those which have proved themselves to be of value, we shall find the list to be surprisingly small. Chief and foremost must be mentioned the old remedy, nitrate of silver. This is one of the most trustworthy of local applications. Unfortunately it is very irritating, even in dilute solutions; besides which it is readily decomposed by the chlorides

present in the pus. Recently a number of combinations of this salt with various albuminous bodies have been placed on the market, several of which have proved to be valuable. The great advantage of these combinations is that they cause little or no pain or irritation when injected, and are not decomposed by the pus. Moreover, as they do not cause a coagulation of the albumin, they seem able to penetrate somewhat deeper into the tissues than pure nitrate of silver.

The earliest of these preparations, argentamin and argonin, proved to be unstable; but the more recent compounds, protargol, largin, and argyrol, are free from this defect.

Next to nitrate of silver and its compounds in order of value are solutions of permanganate of potash, sulphate of thallin, sulphate of zinc, and sulphate of copper.

It is convenient clinically to divide these local applications into three groups—namely, those which are pure antiseptics, as protargol, largin, and sulphate of thallin; those which are both antiseptic and astringent, as nitrate of silver; and those which are simply astringent, as sulphate of zinc.

The above classification is important, for the character of the remedy must be suited to the existing stage of the disease present. In the early and very acute stage we must be careful that the local remedy has but slight astringent properties, or otherwise it will, by diminishing the hyperæmia of the tissues, check the migration of the leucocytes, and so hinder the elimination of the gonococci from the deeper structures. Nor must the injection fluid at this stage be of an irritating nature. However powerful the antiseptic properties of the fluid may be, it is counter-indicated if it causes irritation, and so increases the inflammation. The cocci grow more readily in an

inflamed mucous membrane than in a non-inflamed tissue. Hence, as long as there are signs of acute inflammation present, it must on no account be increased by an irritating lotion.

The fluid selected must be an antiseptic which is unirritating, and as free from astringent properties as possible. The remedies which most nearly fulfil these conditions are solutions of protargol (½ to 1 per cent.), largin (½ to 1 per cent.), argyrol (½ to 2 per cent.), sulphate of thallin (1 per cent.), and permanganate of potash (1 in 10,000). These are the fluids best suited for the treatment of the disease in the acute inflammatory stage. They all possess antiseptic properties—the two latter, it is true, only in a slight degree; they produce neither pain nor irritation when introduced into the urethra, and as they do not cause a coagulation of the albumin, they are capable of a certain power of penetration.

As these fluids are non-irritating, the injection can be retained in the urethra for a considerable time without discomfort. Moreover—and this is an important point—as they have no irritating action, they do not cause a spasm of the compressor urethræ, and so it is possible to inject the fluid into the posterior urethra by means of an ordinary syringe. This it is not possible to do if marked astringent solutions are used.

Injections of these bland fluids should be continued until the disease enters on the second stage, which clinically is recognised by the purulent discharge becoming thinner and more mucoid, and by the disappearance of the pain on micturition. There is now no longer any reason why astringent remedies should be avoided. The cocci having been eliminated from the deeper tissues, our object now is to destroy such cocci as are growing on the surface of the epithelium, and to allay the inflammation they have

evoked. This will be best done by applying one of the astringent antiseptics, such as dilute solutions of nitrate of silver (1 in 10,000) or permanganate of potash (1 in 8,000). When the gonococci have completely disappeared from the secretion, and the disease has entered upon its last stage, the pure astringents, such as sulphate of zinc and alum, may with advantage be used to allay the existing hyperæmia and complete the cure.

Such are in general the lines on which the local treatment of acute gonorrhœa is based. It will be convenient to consider the details of the treatment under two heads, viz.: (1) When the disease affects the anterior urethra only; and (2) when it affects the posterior urethra.

CHAPTER VIII

THE TREATMENT OF ACUTE ANTERIOR URETHRITIS

Although it is unusual for a hospital patient to apply for treatment until the discharge is copious and the disease fairly advanced, it not infrequently happens that the more intelligent private patient seeks medical aid at the first sign of the disorder, even directly after exposure to infection. In such a case the surgeon may feel tempted to try and cut short the malady by the application of some strong antiseptic remedy. This so-called 'abortive treatment' has received much attention, and every few years its use has been revived; yet it must be confessed that there is little to be said in its favour, either from a theoretical or from a practical point of view. We have already seen that the gonococci within even a few hours of the inoculation penetrate between the epithelial cells to the deeper parts of the urethral mucous membrane, in which situation they are effectually protected from the strongest antiseptics that can be applied. Moreover, the use of these strong antiseptics induces a violent inflammatory reaction, which is likely greatly to aggravate the disorder. For these reasons the use of abortive remedies has been to a large extent abandoned.

It might, however, be well to mention the method advocated by Janet, one of the latest of this class of remedies, which has found a certain amount of favour.

As soon as the presence of the disorder is diagnosed, the whole of the urethra is irrigated with a warm solution of permanganate of potash (1 in 2,000). Five hours later the anterior urethra *only* is irrigated with a stronger solution (1 in 1,500), and after a futher interval of five hours with one still stronger (1 in 1,000). For the following four or five days irrigations are repeated every twelve hours with the weaker solution (1 in 2,000). But it is difficult to carry out this method in ordinary practice, and it is by no means certain in its results; while it frequently causes much pain and œdema, and greatly aggravates the ailment.

The only time when the abortive treatment is likely to prove successful is on those rare occasions when the patient seeks medical advice *immediately* after exposure to infection. As the gonococci are then probably merely lying on the surface of stratified epithelium lining the fossa navicularis, the introduction of an antiseptic fluid at this period may reasonably be expected to destroy the specific virus, and so prevent the development of the disease. On the Continent this prophylactic treatment has been largely adopted, and appears to have a considerable measure of success. For this purpose a few drops of either a 2 per cent. solution of nitrate of silver, or a 20 per cent. solution of protargol, are introduced into the meatus immediately after exposure to infection.

Although, as a rule, we may with advantage at once apply local remedies in the acute stage of the disorder, there are two conditions which contra-indicate this treatment. The first of these is an exceptionally acute inflammation, as evidenced by much œdema of the penis and prepuce, excessive chordee, and blood-stained secretion. The other is the presence of a complication such as epididymitis. In such circumstances all local applications must be postponed until the most acute symptoms

have subsided, the treatment being confined to constitutional and hygienic remedies.

In the majority of cases local treatment by injection may be at once begun. As the patient will have to do this himself, it is absolutely necessary to explain carefully to him exactly how the injection is to be made, or it will almost certainly be imperfectly done, and consequently little or no benefit will be obtained. The best instrument for the purpose is some form of syringe. In certain conditions, as we shall see, the application is better made by means of an irrigator, but for ordinary purposes the syringe is to be preferred. Care, however, should be taken to secure the best form of syringe. The ordinary glass gonorrhœal syringe is almost valueless; the piston rarely works well, the nozzle is far too slender, and, as the capacity of these instruments varies greatly, it is a mere chance whether the patient will obtain one holding 2 ounces or only ½ ounce of liquid. A syringe is needed the piston of which works smoothly and accurately: it should be fitted with a large conical nozzle, which, when inserted into the meatus, effectually plugs it, and so prevents the escape of the fluid. The instrument must be large enough to contain sufficient fluid to completely distend the urethra, so that all the folds in the mucous membrane may be obliterated, and the fluid brought into contact with every portion of it. A good form of syringe is depicted in Fig. 9. The barrel is made of either celluloid or glass, and the piston of asbestos or well-oiled leather. Its capacity is 12 c.c. When not in use the syringe should be kept immersed in carbolic lotion.

Fig. 10 illustrates the so-called 'Ockart' syringe, which is peculiar in that the piston-rod is in the form of a screw. By this arrangement any sudden jerking of the injection is prevented. Though an excellent syringe, its

cost is relatively high, and the piston-rod somewhat fragile. I therefore prefer the simpler form shown in Fig. 9.

Fig. 9.

The patient must be directed to pass water with a view to clearing the urethra of its pus; then to inject a syringeful of warm water and to allow it to escape. This is to be repeated a time or two, the object being to remove all trace of urine from the urethra, as almost all the injection fluids are readily decomposed by urine. A syringeful of the solution is then injected. As the capacity of the urethra varies somewhat according to the severity of the inflammation of its walls, the injection should be stopped if a feeling of pain is caused from distension. The fluid should be retained in the urethra by compressing the meatus with the finger and thumb for a length of time varying with the nature of the fluid. If it is of a bland, unirritating character, such as protargol or sulphate of thallin, it should be retained for ten minutes or longer, in order that the fullest opportunity may be given for the fluid to destroy the micrococcus. When the fluid is of an astringent nature, like sulphate of zinc, a shorter time is advisable.

I usually start the treatment by ordering the injection of $\frac{1}{4}$ per cent. protargol or argyrol solution three times a day, the fluid to be retained in the urethra four minutes. The effect of this treatment is generally very marked, the purulent discharge rapidly diminishes,

and the pain and priapism disappear. When these effects are secured, the strength, duration, and frequency of the injections may be gradually increased. At the end of the third day the strength of the fluid may be raised to ½ per cent. solution, at the end of the week to ¾ per cent., and on the tenth day to 1 per cent. At the same time the injections are given more frequently—four, five, or six times a day—and the fluid retained for five minutes. This is all contingent upon the injections being well borne, causing neither smarting nor discomfort, and on the inflammatory symptoms declining. Sometimes these protargol injections are not well tolerated. Instead of being painless, they give rise to severe smarting and increase of the inflammation. Should this happen, the protargol solution must be replaced by one of sulphate of thallin (½ to 1 per cent.).

Under the above treatment the inflammatory symptoms usually rapidly abate, the pain on micturition and priapism disappear, and the secretion diminishes greatly in quantity, and becomes less purulent and more mucoid in character; the pus cells are less numerous and epithelial cells appear. The gonococci are no longer seen in large numbers, and soon almost entirely disappear. When this change has taken place—usually in the second week—the injection fluid should be changed to one having more astringent properties. Twice a day, morning and midday, permanganate of potash (1 in 10,000) may be used, and in the evening nitrate of silver (1 in 10,000). The strength of the latter may be cautiously increased from time to time, for the urethra quickly becomes tolerant of these antiseptics, so that what at first caused smarting and discomfort in a day or two is hardly felt. For the same reason it is well occasionally to vary the nature of the injection. It must be understood that the strength of the

solutions mentioned above represents but an average useful strength. The more acute the inflammation the weaker the injection must be. The effect of the astringent treatment is soon noticed, the discharge rapidly diminishes, until it disappears, and perhaps only a 'thread' or two can be detected in the urine, to indicate the presence of any inflammatory action.

At this stage the patient, being free from pain, and not seeing any discharge, will almost inevitably believe himself to be cured; and unless his error be pointed out to him by his medical attendant, will withdraw himself from

Fig. 10.

all further treatment. Should he do so and return to his former mode of living, in all probability the discharge will reappear; for the gonococci, not being completely eliminated, will, under favourable circumstances, rekindle the inflammation. In the normal course of the disease a cure is rarely obtained under five or six weeks, which period will be prolonged should exacerbations or complications take place.

Should the disease still persist at the end of the sixth or eighth week, as evidenced by the presence of mucus and threads in the urine, it must be regarded as having passed into the subacute or chronic stage, and will require treatment appropriate to that condition, the details of which are to be found under that section (see p. 89).

We may now ask, *by what signs can we determine that the disease is cured?* The answer to this pertinent question is to be found only *in a periodical examination of the urine. As*

long as the urine first passed in the morning shows 'urethral threads' floating in it, the urethra is still inflamed.

Are we, then, to continue the injections until all the 'threads' have disappeared?

Although some authorities would answer this question in the affirmative, it is not, to my mind, a sound conclusion. For it sometimes happens that long after the gonorrhœal inflammation has subsided 'threads' are passed consisting only of epithelial cells held together by mucin, this desquamative catarrhal condition being kept up by the astringent injections. Therefore, towards the end of the treatment it is well from time to time to make a short break in the local applications, in order to ascertain how far the secretion is due to the action of the astringents.

So long as the 'threads' show the presence of gonococci, even occasionally, the disease is not cured. The patient is infectious, and the treatment must be continued. Even if pus cells are constantly to be seen in the 'threads,' it is most probable that the gonococcus still lurks somewhere in the urethra.

On the other hand, should repeated examinations of the 'threads' show that they consist principally of epithelial cells, and no gonococci are present, all treatment may cease.

But the patient must be kept under observation for a fortnight longer, or more, for it is possible that, after all injections have been stopped, and the patient has returned to a more stimulating diet and manner of life, the discharge will reappear, the gonococci which have lurked in some crypt or follicle rekindling the inflammation. The procedure to be adopted in order to determine whether the disease is definitely cured or not is described in Chapter VII., where the subject is considered at greater length.

CHAPTER IX

THE TREATMENT OF ACUTE POSTERIOR URETHRITIS

As the extension of the inflammation to the posterior part of the urethra does not usually take place until about the third week after the beginning of the attack, it usually happens that the case is under treatment when this complication sets in. If the extension of the inflammation gives rise to very acute symptoms—hæmaturia, frequent micturition, or seminal emissions—all injections should be stopped until these symptoms have died down. As in anterior urethritis at such a period, the treatment must be purely constitutional, all local interference tending to aggravate the inflammation.

(1) Constitutional Treatment.

The constitutional treatment is the same as that for anterior urethritis, with the exception that salicylate of soda is generally more useful than the balsams. This drug, though of comparatively little value in inflammation of the anterior urethra, has a very beneficial action in posterior urethritis. Under its action the urine rapidly clears, and the acute distressing symptoms disappear. It may be given in doses of 10 to 30 grains three times a day. Salol or salicine may be used instead, but I prefer the salicylate of soda. These drugs have the great advan-

tage of rendering the urine markedly acid, a point of considerable importance; for, by maintaining the acidity of the urine, we use our strongest prophylactic against the urethral inflammation extending to the bladder, and so producing cystitis. Although, as I have said, salicylate of soda is generally more efficacious in those cases than any of the balsams, it is not always so. If it fails speedily to reduce the symptoms, one of the balsams should be given.

The desirability of maintaining the acidity of the urine must also be borne in mind when dieting the patient. A light milk diet, with the substitution of mineral waters for alcoholic drinks, as so often recommended, causes a decided and undesirable reduction in the acidity of the urine. A further factor in reducing the acidity is the regurgitation of the alkaline pus into the bladder during the night. The powerful predisposing influence that alkaline urine exercises in the production of cystitis is well known. It is well, therefore, not to restrict the patient exclusively to a milk diet, but to allow a fair amount of red meat, and mineral waters should be avoided. Apart from the administration of salicylate of soda, the treatment must also be directed to combating the three prominent symptoms of acute posterior urethritis—vesical tenesmus, hæmorrhage, and seminal emissions. The first may be mitigated by sedatives, such as belladonna and hyoscyamus and the use of hot sitz-baths. Should the distress be very great, small doses of morphia may be given, but this drug must be administered cautiously, large doses tending to increase the vesical irritability.

As a rule, the slight hæmorrhage which accompanies the vesical tenesmus is best treated by the sedatives above mentioned. When of a severe character and unaccompanied by vesical tenesmus, it may be restrained by the administration of ergotin or perchloride of iron, or, better,

by the instillation of cocaine (2 per cent.) and adrenalin (1 in 1,000).

The tendency to frequent seminal emissions, which is so common a feature of this disease, must be energetically combated, for the intense hyperæmia they cause is in the highest degree injurious, retarding the recovery of the mucous membrane.

The importance of rest in the treatment of acute gonorrhœa has already been noticed, but it must be emphasized in connection with acute posterior urethritis. During the acme of the disease the patient should be kept in bed; indeed, his condition is often so pitiful that he has little desire to be about.

(2) Local Treatment.

The principles of treatment for acute posterior urethritis are the same as have been laid down for the acute anterior urethritis, namely, to withhold local applications during the acutest stage of the disease. When this stage is passed, and as the inflammation subsides, the bland antiseptics may be used, and gradually changed to more astringent ones. The application of these remedies requires certain modifications of the method advocated in the preceding section. When the tenesmus and other painful symptoms have quite disappeared under the constitutional treatment, the local applications may be begun by ordering the patient a dilute solution of protargol ($\frac{1}{4}$ to $\frac{1}{2}$ per cent.) or sulphate of thallin (1 per cent.). The solution may be injected three or four times a day in the manner described when speaking of acute anterior urethritis. As these fluids are non-irritating, they do not usually produce a powerful contraction of the compressor urethræ muscle, and so are allowed to pass into the posterior urethra. The injection should be retained in the urethra for fifteen

minutes, so that the primary contraction of the compressor urethræ may relax and allow the fluid to pass backwards. The patient should be instructed to aid the passage of the fluid by relaxing as far as possible the compressor muscle—that is to say, he should try to micturate while the injection is being made. The beneficial effect of the injections is generally quickly seen. Within a few days the purulent secretion diminishes and becomes more mucoid in character. When this takes place and all painful symptoms are absent, the astringent remedies may be applied. But it is useless to order them to be injected with the ordinary gonorrhœal syringe; the fluid would never pass the compressor urethræ, the irritating solution setting up so powerful a spasm of that muscle. As we have seen, it is difficult enough to inject a bland unirritating fluid into the posterior urethra, but it would be impossible to inject the astringent and irritating fluid we now wish to use. We must, therefore, adopt other measures. There are two methods by which our end may be attained. One is by gradually increasing the pressure of the fluid injected at the meatus until it is sufficient to overcome the spasm of the compressor urethræ (Janet's irrigation). The other method is to inject the fluid by some suitable instrument, such as a catheter (Diday's injection).

Janet's Irrigation.—This method was originally introduced as an abortive treatment of acute gonorrhœa, and has still many adherents, but, as I have already stated, it is for this purpose both uncertain and unsatisfactory. It is carried out by means of an irrigator holding a pint or more of fluid, fitted with a couple of yards of tubing and a conical glass cannula. Fig. 11 depicts Valentine's instrument for the purpose. According to Janet, the temperature of the irrigation fluid should in all cases be from 38° to

40° C. The patient having first half emptied the bladder, so as to clear the urethra of pus, the end of the glass cannula is inserted into the meatus and the irrigator raised

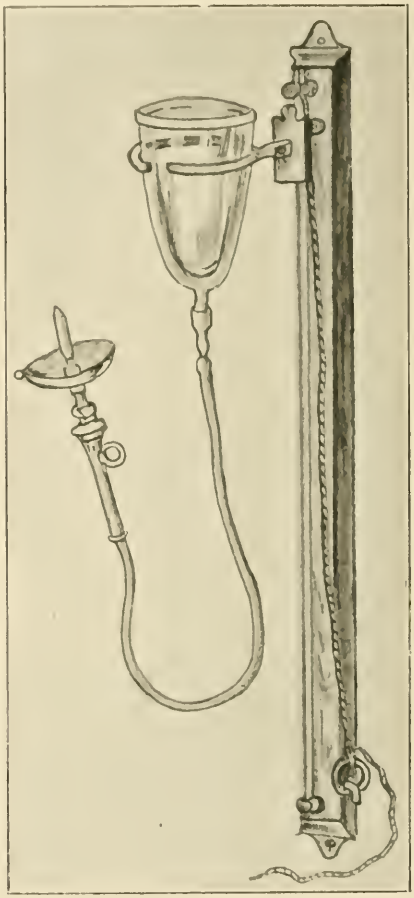

Fig. 11.—Valentine's Urethral Irrigator.

a foot or two. The pressure of the fluid is sufficient to distend the anterior urethra, but not to overcome the compressor muscle. The cannula is then removed, and

the fluid allowed to escape from the urethra. After this has been repeated two or three times with a view to thoroughly washing out the anterior urethra, the cannula is reinserted, and the irrigator slowly raised until the pressure of the fluid is sufficient to overcome the compressor muscle, and the lotion enters the posterior urethra and passes on to the bladder. As a rule, the irrigator must be raised from 1½ to 2 yards before the resistance of the compressor muscle is overcome. The irrigation is best done with the patient lying on his back with the legs apart. As the irrigator is being raised, the patient should be instructed to relax the urethral muscles by trying to micturate. It is by no means always easy to inject into the posterior urethra by this means, the distension of the urethra sometimes causing severe pain. Where this is the case, it is well to give a small preliminary injection of a weak cocaine solution (1 per cent.) a few minutes before irrigating. The principal advantages of this method are that the pressure of the fluid, by stretching the urethral mucous membrane and obliterating its folds, insures the lotion coming into contact with its entire surface. It is often easier and more convenient to administer this injection by means of a large wound syringe fitted with a conical nozzle, especially when it is desired to use only a relatively small quantity of fluid.

Diday's Irrigation.—The patient having half emptied the bladder as before, a large, soft rubber catheter is passed till its eye lies just outside the bladder. The lotion is then injected by means of either a large syringe or an irrigator as the catheter is slowly withdrawn. As long as the eye of the catheter lies behind the membranous urethra, the fluid will pass backwards into the bladder; when the eye has left the membranous part, the fluid will escape at the meatus. In this way the whole of the

urethra is thoroughly irrigated. The bladder is only half emptied, in order that the lotion on entering it may be decomposed by the urine, and so rendered inert, thus effectually preventing the solution from unnecessarily irritating the vesical mucous membrane. Abundant experience has shown that the fear of infecting the bladder by these methods of irrigation is groundless. The fluid injected into the bladder does not require to be removed by the surgeon; it is passed naturally at the close of the procedure.

Of the two irrigation methods, that of Diday's is to be generally preferred, as being easier of performance and causing less pain and irritation to the parts concerned. It is better to reserve Janet's method for the more chronic forms of the inflammation.

When starting the irrigation it is best to select very weak solutions of mild remedies, such as protargol (¼ to 1 per cent.) or sulphate of thallin (1 per cent.), and after a few days to pass on to stronger and more astringent solutions, such as permanganate of potash (1 in 2,000 to 10,000) or nitrate of silver (1 in 10,000 to 1 in 500). As a rule the nitrate of silver solutions are the most efficacious.

The irrigation is performed by the surgeon every two or three days, the patient continuing his injections with the small syringe twice a day. In a week or two the secretion diminishes, so that it only manifests itself as a slight mucous cloud and by the presence of a few 'urethral threads' in both portions of the urine.

We may now proceed to use remedies of greater strength, applying them in minute quantities by the method of instillation.

Instillation.—There are two instruments used for this purpose: one is Guyon's instillation syringe, and the

other is Ultzmann's. Guyon's instrument (Fig. 12) is furnished with a fine flexible 'acorn-headed' catheter; Ultzmann's (Fig. 13) has a rigid metal or vulcanite catheter, also with a fine terminal opening. Both instruments are well adapted for their purpose, but I prefer that

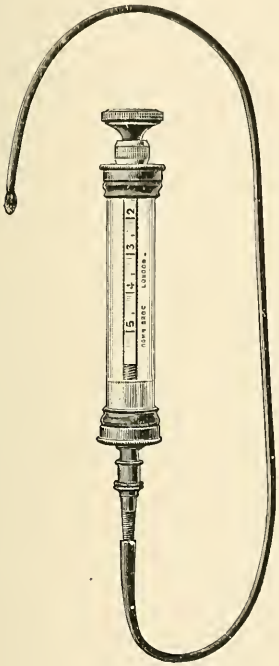

Fig. 12.

Fig. 13.

of Ultzmann's, as it is more readily introduced and more easily sterilized. The catheter is lubricated with glycerine; oil must never be used, as it would smear the epithelium and protect it from the injection. The catheter is introduced as far as the vesical orifice, then slowly withdrawn, and the injection fluid applied drop by drop along the

whole of the urethra. The fluid used is a solution of nitrate of silver, in strength varying from $\frac{1}{4}$ to $\frac{1}{2}$ per cent.

The instillation is made two or three times a week, the patient in the intervals continuing his urethral injections.

Simple posterior urethritis, unless complicated by an infection of the prostate, generally responds readily to treatment, and usually clears up before the inflammation in the anterior part. When, therefore, it is seen that the second portion of the morning urine is constantly clear, the special treatment of the posterior urethra should be stopped, and the anterior urethra only treated.

In those cases where the posterior urethritis persists in spite of treatment for more than five or six weeks, it is generally due to an infection of the prostate or vesiculæ.

Note.—It may be well to give in some detail Janet's permanganate of potassium treatment for urethritis, as it has been so largely adopted, although I personally regard it as decidedly inferior, for the majority of the cases, to the treatment which I have already described. Since the original publication Janet has repeatedly modified the details of his method of procedure, and the following account has just been issued by Kollmann* as the one recently sketched out to him by Janet himself.

During the first three or four days of an acute urethritis of the anterior portion the irrigation is given twice daily.

Gradually longer intervals are interposed, so that the irrigations take place only every eighteen, twenty-four, thirty-six, or forty-eight hours. As the diffuse turbidity of the urine disappears the interval is increased from eighteen to twenty-four hours, and from thirty-six to forty-eight hours when the secretion is no longer purulent. Should an infection of the posterior part take place during

* Oberländer and Kollmann, 'Die chronische Gonorrhœ der männlichen Harnröhre.' 1905.

the treatment, the whole urethra must immediately be irrigated twice daily, just as in the commencement of the treatment, when the anterior part alone was affected. After a few days the urine will generally clear again. From this time the posterior irrigation may be dropped, and the anterior one alone continued. In an acute anterior urethritis, without excessive inflammatory symptoms, ½ litre of a 1 in 500 solution of permanganate of potassium is used, immediately followed by an irrigation of ½ litre of boracic lotion. This strength is maintained throughout the entire course of treatment, always provided that no signs of intolerance appear. When, towards the end of the treatment, it is thought that the disease is cured, pauses of thirty-six to forty-eight hours are made and a solution of from 1 in 3,000 to 1 in 4,000 is used without the subsequent boracic irrigation. Should an infection of the posterior portion arise during the treatment, or be present previously, then only weak solutions of a strength of 1 in 10,000 to 1 in 4,000 must be resorted to if the passage of it into the bladder be difficult. If, however, the solution passes in easily, then a strength of 1 in 2,000 to 1 in 1,000 may be used, following it up with the boracic irrigation. In cases where the acute inflammatory symptoms are considerable, very weak solutions of 1 in 10,000 to 1 in 4,000 should be used, and only the anterior portion irrigated, even if the posterior be also affected. The whole urethra should not be irrigated until the acute inflammatory symptoms have subsided. When the acute stage is over it is sufficient to irrigate with a medium strength of 1 in 2,000 to 1 in 1,500 once daily. The temperature of the solution must always be from 38° to 40° C. Care must be taken to see that the bladder is emptied immediately after the irrigation, otherwise the permanganate of potassium solution will cause irritation.

CHAPTER X

CHRONIC URETHRITIS

THE symptoms of acute gonorrhœa usually begin to abate about the end of the third week, and gradually die down, until, towards the close of the fifth or sixth week, the entire process is complete. This rapid recovery, however, is liable to be indefinitely prolonged by a variety of causes, as relapse, or by the extension of the inflammation to the posterior urethra. In such cases the disease is apt to become chronic, the diffuse inflammation of the acute stage becoming localized in one or more small circumscribed areas.

Attention has already been drawn to the fact that as soon as the painful symptoms have passed away and the free discharge has ceased, the patient is very likely to think himself cured, and therefore withdraws himself from further treatment, or, at any rate, relaxes all stringent regulations as to diet, rest, etc. The usual effect of this indiscretion is to provoke afresh the symptoms of the acuter stage of the disease. Such a relapse may occur again and again, and each time, though the inflammatory reaction is less acute than before, it runs a much more tedious course.

At times the rekindling of the inflammation is due to a fresh infection, for gonorrhœa gives no immunity from a recurrence of the disorder; a reinoculation may therefore

take place at any period. But in the large majority of cases the recrudescence is a relapse, and not the result of a reinfection. This is proved by the fact that the acute symptoms follow directly upon the sexual indiscretion, and not after an incubative period of some three or four days, as they would if they were due to a reinfection.

Another frequent cause of the inflammatory condition becoming chronic is its extension to the posterior urethra. Although, as we have seen, this usually yields quickly to appropriate treatment, it is specially prone to severe exacerbation when treated in an unsuitable manner.

It is becoming increasingly evident that in the great majority of cases of chronic urethritis the prostate has become affected, the inflammation spreading to and infecting its numerous mucous glands, from which it can be dislodged only with the utmost difficulty. It is necessary to emphasize the frequency with which the glands of the prostate are affected in chronic gonorrhœa. There is unfortunately a widely-spread opinion that this gland is but rarely affected with gonorrhœa, and that when it is so affected the symptoms provoked are so striking and urgent as to prevent the complication being overlooked. This is true only of that rare form of prostatitis which runs an acute course, and terminates in prostatic abscess.

But there is another and far more common form, which develops insidiously and gives rise to a muco-purulent desquamative catarrh of the numerous glands of the prostate. I have recently paid considerable attention to this point, and I hope ere long to publish some statistics on it. Without going into details now, I may briefly say that the frequency with which the prostate is involved is greatly underestimated. My own observation leads me

to conclude that the infection is present in the majority of cases where the disease has become chronic. There are certain constitutional conditions, such as phthisis, anæmia, and general ill-health, which seem to play some part, though a distinctly minor one, in rendering the attack chronic.

There is naturally no sharp line to be drawn between the morbid processes observable in the acute and the chronic forms of this disease, the one form merging imperceptibly into the other. The general diffuse inflammation of the acute stage dies down save in certain places more or less circumscribed, where it lingers. Here, in consequence of the prolonged irritation of the gonococci, there is called forth a proliferation of the subepithelial tissue cells, forming the so-called small-celled infiltration. This proliferation of the connective tissue cells may be regarded as marking the onset of the chronic stage. These areas of small-celled infiltration are generally themselves small and circumscribed, and most frequently are situated round or about the lacunæ and ducts of the mucous glands. As the infiltrations are accompanied by a considerable increase in vascularity, they present a granular appearance.

These circumscribed infiltrations develop immediately beneath the epithelium, which at first lies over them, either unchanged or but slightly œdematous and loosened. Erosions or ulcerations are decidedly rare. After a time the infiltration undergoes a form of sclerosis, spindle-shaped connective tissue cells and fibres developing, and the soft infiltration gradually passing into a fibroid scar. At the same time the epithelium lying over it also undergoes a metaplasia, gradually losing its cylindrical form and assuming a stratified, squamous type. Similar changes may be observed in other parts of the body—as,

for example, the growth of the epithelium over scar tissue in the intestine.

The principal inflammatory changes occur in the region of the mucous follicles and ducts of the glands of Littré and Morgagni. Consequently it is in those portions of the urethra which are richest in glandular tissue (such as the prostatic and bulbous) that the inflammation is most marked and lingers the longest. The rich glandular tissue of the prostate, especially in the neighbourhood of the caput gallinaginis, is very prone to chronic inflammation, giving rise to a desquamative or purulent catarrh of the glands. The subsequent cicatricial contraction causes a narrowing, or obliteration, of the ducts, and the formation of small mucous cysts and abscesses.

As a rule the inflammation does not extend beyond the subepithelial tissue, the deeper structures being unaffected. When, however, the periurethral tissues do become involved, the subsequent cicatricial contraction causes a diminution in the calibre of the urethra, and so gives rise to the formation of a stricture.

Classification.

The forms of chronic urethritis are conveniently divided, both pathologically and clinically, into two classes, determined by the inflammation being either limited to the mucous membrane, as it usually is, or extended to the deeper subepithelial tissues. The classes are thus denominated by Finger:

I. Urethritis Chronica Anterior.

This embraces two subdivisions:

(1) Urethritis chronica anterior superficialis mucosa.

(2) Urethritis chronica anterior profunda.

II. Urethritis Chronica Posterior.

This also embraces two sections :

(1) Urethritis chronica posterior superficialis mucosa.

(2) Urethritis chronica posterior profunda.

Symptoms of Chronic Urethritis. — The symptoms of chronic urethritis vary according to the degree of the inflammation present and the extent and depth of the urethra involved. In the earlier stages, when the acute inflammation is beginning to settle down into the chronic condition, and when there is still a large extent of mucous surface affected, the discharge is the most prominent symptom. This discharge is usually profuse, although the amount and character of it may vary considerably.

As the inflammation becomes localized to one or more spots in the urethra, the discharge lessens in amount, and passes from the purulent condition to a thin, clear mucus, just sufficient to stick the lips of the meatus together. The urine is more or less cloudy, according to the quantity of secretion present, and seldom fails to show the presence of urethral or gonorrhœal 'threads.' Numerous attempts have been made to diagnose the seat of the chronic inflammation by the form and appearance of these threads, but so far without marked success. Two distinct forms are, however, met with—one a long, slender, transparent, gelatinous thread, the formation of which has been already described; the other a short, stout, yellowish, opaque body, which is derived from the various gland ducts and follicles of the urethra. The presence of these latter bodies in large numbers is a sure sign of an intense inflammation of the urethral glands, and therefore a call for unfavourable prognosis.

Chronic Urethritis Anterior.

Symptoms.—When the inflammation is localized in the anterior urethra, and is limited to the mucous membrane —that is to say, has not affected the submucous tissue— it causes but little inconvenience to the patient. There is usually a complete absence of pain on micturition, though sometimes a slight irritation is felt at the end of the penis. The most noticeable symptom is the well-known bead of purulent secretion, which is found at the meatus on waking in the morning, and is aptly called the 'bon-jour drop.' The secretion is so slight that during the day, when the urethra is frequently irrigated by the stream of urine, the drop of pus may not be seen, though the lips of the meatus may stick together.

If the urine be divided into two portions—Sir Henry Thompson's test—the first only will be cloudy, the second portion clear. If the urethritis be fairly recent, the first portion of urine will be turbid from mucus, and will show the presence of urethral threads. If the process be of long standing and free from any exacerbation, the urine will be quite clear and free from mucus, but will show the threads floating in it. *Often the only sign of a chronic urethritis is the presence of a few urethral threads floating in the urine first passed in the morning*, the secretion in such cases being too slight and tenacious to appear at the meatus as the 'bon-jour drop.' Should the inflammation extend to the tissues beneath the mucous membrane, other and more serious symptoms are likely to develop. For, as the succulent small-celled infiltration gradually undergoes cicatricial contraction, the lumen of the urethra is diminished, and the symptoms of a stricture are added to those described above.

Chronic Urethritis Posterior.

Here, as in chronic anterior urethritis, the disease is often unnoticed by the patient, owing to the absence of pain or appreciable secretion. And it is only the presence of the urinary threads in the second as well as in the first portion of the urine passed that indicates to the surgeon the existence of the disease. As long as the inflammation is superficial—that is, has not penetrated deeper than the urethral mucous membrane—the presence of slight turbidity in the second portion of the urine may be the only symptom. As in chronic anterior urethritis, if the inflammation be fairly recent, the urine will be cloudy from the presence of mucus, and floating in it will be seen numerous urethral threads. On the other hand, when the inflammation is of long standing, the urine will be quite free from mucus, the threads floating in clear urine. It is, however, to be noticed that a slight exacerbation of an old chronic case will at once bring back the mucus in the urine. Such exacerbations are most common.

It is sometimes possible to diagnose the presence of posterior urethritis by the peculiar appearance of the urinary threads alone. The prostatic urethra is rich in large glands, which open on either side of the caput gallinaginis, and an inflammation of this part is sure to affect these glands, and in consequence their ducts become blocked with thick muco-purulent matter, which is squeezed out in the form of small comma-shaped masses by the powerful contraction of the compressor urethræ at the close of the micturition. The presence of these small comma-shaped threads of muco-purulent matter should therefore lead one to suspect an inflammation of the prostatic urethra. Chronic posterior urethritis, as already

stated, is frequently unattended by subjective symptoms, as long as the inflammation is limited to the mucous membrane; but should the deeper structures of the urethra become involved, most distressing symptoms will be evoked.

The urinary, sexual, and general nervous symptoms are due to the inflammation and consequent irritation of that highly-nervous organ, the prostate. One of the earliest of the symptoms is a distressing desire for frequent micturition, often attended by considerable pain radiating from the neck of the bladder to the rectum, hypogastrium, and end of penis. The desire to empty the bladder is imperative, and the patient is compelled then and there, however situated, to void his urine.

Frequent seminal emissions are another sign of irritation in the prostatic urethra, and at times develop into a true spermatorrhœa. But more commonly what the patient looks upon as the involuntary emission of seminal fluid is really an escape of prostatic secretion—a *prostatorrhœa*—as can be proved by a microscopic examination of the fluid. The prostatic secretion is evidenced by the absence of spermatozoa and the presence of sperm crystals. The frequent seminal emissions have a most disastrous influence on the health and physique of the patient, and especially if accompanied by the presence of spermatorrhœa or prostatorrhœa. The thoughts are concentrated on the sexual trouble; headache, listlessness, loss of memory and a dull, heavy backache supervene, and the man gradually drifts into a wretched sexual neurasthenic.

CHAPTER XI

THE DIAGNOSIS OF CHRONIC URETHRITIS

Before we can determine the line of treatment it is wise to adopt in any given case, an exact diagnosis of the conditions present must be made. The following questions require to be answered:

1. Where is the seat of the inflammation? Is it in the anterior, the posterior, or in both portions of the urethra?

2. Is the inflammation limited to the mucous membrane, or has it extended to the deeper structures?

In order to answer these questions, a thorough and methodical examination of the patient is necessary, and I have indicated below the lines on which such an examination may proceed. It must, however, be understood that to complete the whole several examinations are necessary.

1. *The history of the illness and of the symptoms complained of is to be carefully noted*, especially with reference to the date of the first infection, the severity and duration of acute symptoms, the presence or absence of complications, and the history of relapses or reinfections.

A careful inspection and palpation of the penis, perinæum, and testicles, should be made, in order to determine the presence or absence of such conditions as balanitis, urinary fistulæ, periurethral inflammation, epididymitis, or any other complication.

2. *A minute examination of the urine is also to be made.*

The morning urine must be divided into two portions. If the first quantity contains threads and the second is clear, the anterior urethra only is affected; if both contain threads, the urethritis extends to the posterior also.

This test, however, is open to two fallacies: (*a*) It does not distinguish between a urethritis limited to the posterior urethra and one affecting *both* portions of the urethra; and (*b*) it fails in those cases of posterior urethritis where the secretion is so scanty that it does not regurgitate into the bladder. To meet these difficulties, one or both of the following devices may be adopted:

(*a*) *The Irrigation of the Anterior Urethra.*—This procedure, the details of which have been described, is for most cases the simplest and the best. If the irrigation fluid returns clear and free from pus or threads, and the urine subsequently passed is cloudy, the inflammation is limited to the posterior portion. If there are threads in the irrigating fluid and none in the urine, the inflammatory condition is confined to the anterior portion. And if there are threads in both fluids, the inflammation is present in both portions of the urethra.

(*b*) *The Injection of the Methylene Blue.* — Kromayer, instead of irrigating, injects a solution of methylene blue into the anterior portion of the urethra by means of an ordinary urethral syringe. The patient is then allowed to micturate, when all the threads and pus cells originating from the anterior will appear stained with blue; those from the posterior will be unstained.

3. *Microscopic Examination of the Secretion.*—In addition to the macroscopic examination already referred to, it is necessary to examine the secretion and urinary threads more closely under the microscope, for by this means it is possible to determine the stage of the inflammation, and to gauge the effect of the treatment. The composition of

the threads will be seen to vary as the disease progresses. In the earlier stages the threads are formed principally of pus cells, and gonococci are numerous. At a later stage the pus cells are largely replaced by squamous epithelium, and the gonococci are met with in sparing numbers, and are frequently absent from the secretion for days together. This frequent absence of the specific micro-organism is a point of much interest and practical importance, more especially in determining whether or not the disease is cured.

In examining for gonococci in chronic urethritis, the following points are to be noted: (*a*) The cocci are seldom present in large numbers, and tend to diminish in number as time goes on.* (*b*) The cocci are generally extracellular. (*c*) Long after they have disappeared from the urinary threads and sediment they may be detected in the secretion expressed by massage from the prostate and other urethral glands. (*d*) When the cocci are apparently absent, a mechanical or chemical irritation of the urethra will often cause them to reappear in large numbers. At such times the cocci are found within the pus cells, as in the acute stage. (*e*) Not infrequently other bacteria, bacilli, and cocci are found in the secretion, either

* The following statistics, published by Goll, 1891, show the tendency of the gonococci to disappear with the duration of the disease :

Duration of Disease.	Percentage of Cases in which Gonococci were Present.
Fourth to fifth week	47
Sixth week	38
Seventh week	31
Second month	20
Third month	17
Sixth month	14
One year	14
Two years	5
Three years	2·5
Five years	—

associated with the gonococcus or not. The presence of such bacteria is due to a secondary infection, and is of no special significance (Fig. 14). (*f*) In some cases the gonococci entirely disappear, and however carefully the secretion be examined, the specific micro-organism cannot be detected. Here it must be assumed that the gonococci have died, though the inflammatory changes they gave rise to continue. It may here be remarked that the detection of gonococci in the chronic stage

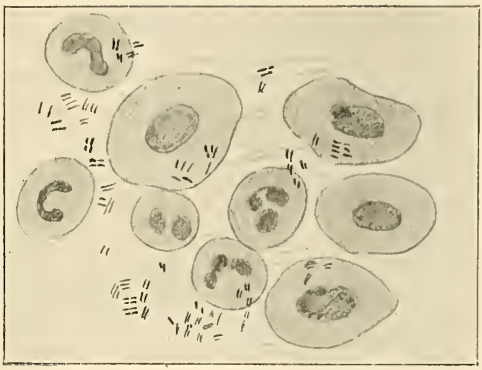

Fig. 14.—Chronic Gonorrhœal Pus, showing Secondary Infection with a Short, Slender Bacillus.

of the disease demands considerable bacteriological experience.

Neisser divides chronic gonorrhœa into three phases: (*a*) Urethritis chronica, with gonococci present in the secretion or in the threads; (*b*) a mixed secondary infection, when the secretion shows a large number of different bacilli and cocci, either associated with the gonococcus or not; (*c*) an aseptic urethritis, when micro-organisms are no longer found.

4. *The next step in the examination of the patient is to ascertain whether the glands of the prostate are inflamed or not.*

This is determined in the following manner: The patient is instructed to pass into two glasses the *greater part* of his urine, which has been allowed to collect in the bladder for some hours. The surgeon then gently massages the prostate from the rectum, and in so doing expresses into the urethra the contents of the prostatic glands and ducts. The remaining portion of urine is then passed into a third glass, and is examined for threads, pus cells and cocci.

Another method of obtaining the prostatic secretion is to direct the patient to empty the bladder, which is then

Fig. 15.

filled with boracic lotion. The prostate is then massaged, and the patient instructed to empty the bladder again. Any pus cells or threads seen in the boracic fluid can have come only from the prostatic glands. The prostate is massaged either by the finger, protected by a rubber glove, or by some suitable instrument, such as Feleki's (Fig. 15).

The condition of the bladder and seminal vesicles should also be ascertained. For details as to the examination of these organs the reader is referred to pp. 127 and 124 respectively.

5. *Having determined the seat of the inflammation, it*

becomes necessary to ascertain whether it is limited to the mucous membrane or has extended to the deeper structures.

In order to do this an 'acorn-headed' black gum bougie (Fig. 16) of as large a size as the meatus will admit (say a No. 12 or 14 English) is gently passed down the whole length of the urethra. If the head of the bougie passes over an inflamed area, a twinge of pain is felt by the patient, which ceases as soon as the head has passed beyond the affected spot, but is felt again when the head passes over it as the bougie is being withdrawn. By noting these sensitive spots, the seat, and roughly the extent, of the inflammation may be determined. Moreover, the passage of a large acorn-headed bougie proves the absence of any

Fig. 16.

decided stricture of the urethra, to ascertain which is of the greatest importance.

But it must be observed that although this bougie is a useful instrument in helping one to form the diagnosis, its usefulness is limited. It has been seen that the meatus is the narrowest and least elastic portion of the urethra, consequently a considerable contraction of the inflamed canal may take place without the calibre of the lumen falling below that of the meatus. Such contractions Otis designated 'wide strictures.' It is obvious that in such cases it would be impossible to detect the narrowing by means of the bougie. The degree of contraction in such cases may, however, be determined by the use of the urethrometer. This instrument, when introduced into the urethra, can be expanded at will, the degree of expansion being indicated by a pointer on a dial. The figures on the dial correspond to the French, or Charrière's, scale for all

urethral instruments. In this scale each number represents an increase of $\frac{1}{3}$ millimetre in diameter—*i.e.*, No. 1 bougie

Fig. 17.

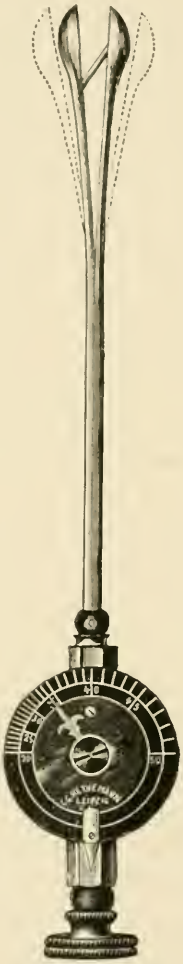

Fig. 18.

Fig 19.

has a diameter of $\frac{1}{3}$ millimetre; No. 3 = 1 millimetre; No. 30 = 10 millimetres, etc. Of this instrument three forms are illustrated above, Fig. 17 being Otis's well-

known instrument, the first that was devised for the purpose. Fig. 18 is Weir's; Fig. 19 is Kollmann's. These latter are of later date, and have the advantage of being less fragile.

The dilatability of the normal urethra in its various parts has already been given (see p. 4). Any inflammatory infiltration of the urethra renders it less and less dilatable, according to the depth to which the infiltration has penetrated and its advancement towards fibrosis. By carefully comparing the amount of dilatation which the urethra will admit with its normal dilatability, a very good idea of the extent and depth of the inflammation can be arrived at. In use the closed urethrometer is passed down the length of the canal, and the dilatability of each portion of the urethra is tested as the instrument is gradually withdrawn. The expansive terminal of the urethrometer is covered with a thin indiarubber capsule to protect the delicate mucous membrane from injury. This instrument is of the greatest value as an aid to exact diagnosis.

Lastly, the urethral mucous membrane should be examined by means of the endoscope. As a full description of the uses of this valuable instrument would be impossible in the space at command, a brief account only of it can be given.* By its use it is possible minutely to inspect the inflamed surface of the urethra, and so to gain a clearer knowledge of its condition than by any

* For a full account of the urethroscope the reader is referred to the following works: Fenwick, Hurry, 'The Electrical Illumination of the Bladder and Urethra'; Grünfeld, 'Die Endoskopie der Harnröhre und Blase,' Stuttgart, 1881; De Keersmaecker and Verhoogen, 'L'Uréthrite Chronique d'Origine Gonococcique,' Bruxelles, 1898; Oberländer, 'Lehrbuch der Urethroskopie,' Leipzig, 1893; Oberländer and Kollmann, 'Die Chronische Gonorrhœa der Männlichen Harnröhre,' Leipzig,' 1905; Valentine, 'The Irrigation Treatment of Gonorrhœa,' New York.

other means; but it is neither necessary nor advisable to use it in every case. Its chief value lies in the help it affords in the observation and treatment of the later chronic stages of the disease. It should never be used in the acute stage.

In its simplest form the endoscope consists solely of a

Fig. 20.

straight metal tube, 5 or 6 inches in length, having a funnel-shaped opening at one end (Fig. 20). The tube being introduced into the urethra, the light is reflected down the funnel end by means of a mirror. The illumination, however, is so imperfect that the instrument in this form is of but limited value. To correct this several

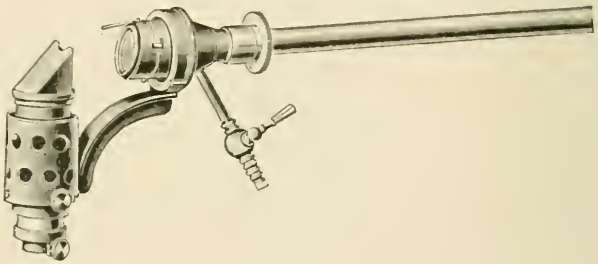

Fig. 21.

modifications have been devised, of which Schall's or Valentine's is to be preferred. Schall's instrument (Fig. 21) is a modification of Casper's endoscope, and is, I think, the best form of *indirect* illumination, the light from a small incandescent lamp being reflected by means of a prism down the urethral tube.

Valentine's instrument (Fig. 22) is the most convenient form of *direct* illumination. Here the source of light is a minute incandescent lamp, mounted at the end of a rigid metal wire, that can be passed down the tube, thus directly illuminating the portion of the membrane under observation. This instrument gives a sharper illumination, but it has the disadvantage of being more fragile, and of possibly unduly heating the mucous membrane, if the observer be too deliberate in his examination.

There are several other urethroscopes of considerable

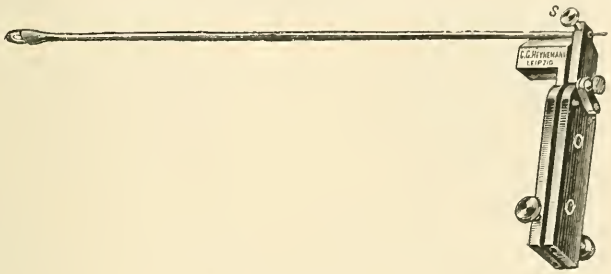

Fig. 22.

merit upon the market, but the two I have described above are generally regarded as the best forms.

In using the endoscope the patient should lie on a high table, or, better, recline in a gynæcological examination chair in the lithotomy position, the surgeon sitting in front. The largest tube that the meatus will admit must be selected, as the illuminated area is necessarily small. If the urethra is very sensitive, a 3 per cent. solution of cocaine may with advantage be previously injected. Then the tube, the end of which is closed with an obturator or plug, and being well lubricated with glycerine, is gradually introduced. In order to pass it into the posterior urethra, the ocular end of the instrument must be well depressed, as the tube passes under the symphysis

pubis. The obturator is now withdrawn, the lamp is passed down the tube, and the light is switched on, when the mucous membrane can be examined little by little as the tube is gently drawn out.

All secretion, blood or urine, must be carefully mopped up, each portion of the membrane being cleaned and inspected as it comes in view. For cleaning purposes it is convenient to use thin wooden strips, having a little cotton-wool wrapped round one end.

In the normal condition, except during micturition, the

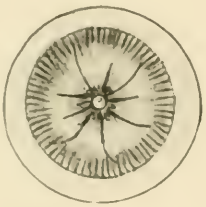

Fig. 23.—Membranous Portion of Normal Urethra as seen through the Endoscope, showing Small Round Central Figure with Numerous Fine Radiating Folds.

Fig. 24. — Normal Prostatic Urethra, showing the Anterior Portion of the Caput.

walls of the urethra are in contact, lying in longitudinal folds. The passing of the urethroscope separates the walls; but as it is being withdrawn they fall together again, at a short distance from the end of the tube, in the form of a funnel, the folds radiating from a central point, which has much the appearance of a sphincter, and is called 'the central figure' (Fig. 23).

In the normal condition of the prostatic urethra the mucous membrane is smooth and of deep red colour. As the tube is withdrawn, the mucous membrane becomes paler, and a rounded prominence appears at the lower edge of the tube; this prominence represents the caput gallinaginis (Figs. 24 and 25). As the tube is still further

withdrawn the caput disappears from view, and the membranous portion is inspected. This is generally paler in colour than the prostatic, and the central figure is more regular. In the bulbous part the folds of mucous membrane are larger, and the central figure appears as a vertical fissure (Fig. 26), and at times the openings of Cowper's glands can be seen in the floor. In the penile part the opening of the glands of Littré and Morgagni can be seen in the upper and lower walls of the urethra. In

Fig. 25. — Normal Prostatic Urethra, showing the Caput Gallinaginis.

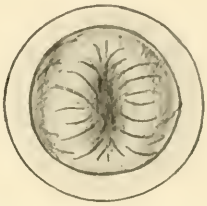

Fig. 26.—Normal Urethra in the Middle of the Bulbous Portion. Central Figure Vertical.

the glans the membrane has almost lost its red colour, and the round 'central figure' has become triangular.

The Appearance of the Chronically Inflamed Urethra.

Two forms of inflammatory lesions can be seen by the endoscope in chronic urethritis. The first is that which was described when speaking of the morbid anatomy of the condition as consisting of localized small-celled infiltrations of the subepithelial tissues, causing swelling and hyperæmia of the mucous membrane. This represents the 'soft infiltration' of Oberländer, and is the early stage of the chronic gonorrhœal process. The second group of pathological changes forms what Oberländer calls the 'hard infiltration.' It includes all the inflammatory pro-

cesses by which the small-celled soft infiltration gradually passes into firm fibroid scar tissue, which reaches its highest development in the formation of a stricture. The conversion of a soft infiltration area into firm cicatricial tissue is a gradual process, all the phases of which can be observed by the urethroscope.

Soft Small-celled Infiltration.

In the soft small-celled infiltration in its most typical stage the mucous membrane is hyperæmic and redder than normally. Its epithelium is œdematous, dull, and loosened, so that it is readily detached, and may be altogether absent in places, leaving small erosions which bleed on being touched by a probe. In consequence of the swelling and œdema of the mucous membrane, the longitudinal folds, into which the urethra is normally thrown when the passage is not distended, are coarser and less numerous. Instead of seeing several fine folds radiating from the central figure, as normally, three or four thickened folds press forward into the lumen of the endoscopic tube. In the penile portion the openings of the crypts of Morgagni are seen to be reddened and swollen, whilst in the prostatic urethra the principal changes are grouped around the caput gallinaginis, which is swollen and hyperæmic, and projects into the tube, looking not unlike a ripe raspberry.

Hard Infiltration.

Pari passu with the gradual cicatrization of the soft small-celled infiltration, the hyperæmia, turgescence, and elasticity of the affected mucous membrane diminish. The red, angry-looking membrane becomes paler and paler as the infiltration hardens. The epithelium be-

comes thicker and less transparent; frequently it takes on a curious stippled appearance, and may undergo so marked a proliferation as to give rise to a form of pachydermia. The longitudinal folds of the mucous membrane gradually disappear, becoming both less marked and less numerous (Fig. 27). In the later stages of the disorder, where considerable contraction of the inflammatory area has taken place, these folds may entirely disappear, so that the urethra as seen through the endoscope appears as a stiff, inelastic tube with smooth pale walls.

Fig. 27.—Appearance of Chronically-Inflamed Urethra, showing an Old Infiltration Area in the Penile Portion. Central Figure Gaping,. Longitudinal Folds less Numerous and less Marked than Normally.

It must be remembered that the normal mucous membrane varies greatly in colour according to its vascularity and other circumstances, so that too much importance must not be attached to a slight alteration in its tint. The use of cocaine, too, causes a contraction of the vessels, and consequent paleness of the surface. Considerable experience is therefore necessary in order rightly to interpret the endoscopic picture.

The Urethra as it appears during the Process of Healing.

The gradual healing of the inflammatory process under appropriate treatment can be readily observed by means of the endoscope. The mucous membrane covering the

soft infiltration gradually loses its angry red colour, and regains its normal appearance. As the swelling of the membrane dies down the longitudinal folds become finer and more numerous, and the lining epithelium regains its bright, transparent, glistening appearance. It is around the crypts and follicles of the urethra that the inflammation is seen to linger longest. For some time after the rest of the urethra has regained its healthy appearance a zone of inflammation may be seen to surround the openings of the large lacunæ and glands, from the mouths of which a muco-purulent secretion may occasionally be expressed.

Where the inflammatory lesion has proceeded to the development of cicatricial fibrous tissue (hard infiltration) the return of the mucous membrane to its normal appearance is naturally slower and less complete. Although to a large extent it regains its healthy colour, yet in the immediate neighbourhood of the infiltration the membrane remains permanently paler in colour. The epithelial lining becomes smoother and healthier, but does not always recover its normal glistening appearance, though its excessive proliferation disappears. After complete healing of the inflammation small whitish-looking scars may be seen in the mucous membrane, especially in the neighbourhood of the bulb and around the large mucous follicles.

CHAPTER XII

THE TREATMENT OF CHRONIC URETHRITIS

It has already been indicated that clinically all cases of chronic urethritis can be divided into two groups:

1. *The more recent*, or the *subacute*, where, in addition to the localized areas of cellular infiltration, there is *a more or less general catarrhal inflammation of the mucous membrane*, and the presence of mucus as well as threads may be traced in the urine.

2. *The inveterate or circumscribed*, in which there is no general catarrh, the whole trouble being confined to definite localized portions. This group may again be divided into (*a*) those that affect only the mucous membrane, and (*b*) those that affect the submucous tissue also.

Each of these forms requires a different mode of treatment. In the *recent* variety, attention must first be directed to subduing the general catarrhal condition by means of weak, astringent solutions, leaving the treatment of the localized areas of cellular infiltration till this has been accomplished.

In the *superficial circumscribed* variety the localized infiltration area may be treated by means of strong astringent and caustic remedies, applied directly and solely to the affected spot.

In the *deep circumscribed* form, in addition to surface applications, pressure and dilatation must be tried, in order to induce absorption of the deep induration.

The suggestions as to hygienic and dietetic measures and internal remedies made in speaking of the acute form of the malady (p. 41) are equally applicable to the chronic condition, though, owing to the longer duration of the treatment, it will probably be found necessary to relax some of the more stringent regulations as to diet, etc. Therefore we may now proceed at once to the consideration of the special local treatment of the disease in its various chronic forms.

Subacute Urethritis.

The first aim must be to subdue the general catarrhal condition of the mucous membrane, leaving the areas of cellular infiltration to be treated later. Experience has shown that the best remedy to effect this is the irrigation of the canal with mild astringent solutions. For this purpose the ordinary small urethral syringe is rarely suitable, for, as has been already explained, the anterior urethra is seldom solely affected in chronic gonorrhœa, the inflammation generally extending to the posterior portion; consequently to use the small syringe for injection would probably leave a large portion of the inflammation untouched. This is one of the commonest errors in the treatment of gleet. It is essential to success that the irrigation fluid be brought into contact with the whole of the walls of the urethra. This may be accomplished, as has already been shown in the treatment of the acute stage of posterior urethritis, by gradually increasing the pressure of the fluid injected at the meatus by means of the irrigator or large syringe until it is sufficient to overcome the spasm of the compressor urethræ (Janet's irrigation). Another method is to inject the fluid by means of a soft rubber catheter passed into the posterior urethra (Diday's irrigation). It is well to select that method which causes the patient the least discomfort.

Sometimes it is the one, sometimes the other. If it is important to avoid all unnecessary irritation to the urethra, it is especially so as long as the presence of mucus in the urine shows that a general catarrh exists.

The Injection Fluid.—Experience has shown that the organic combinations of silver, as protargol and argonin, have not the same value in the chronic that they have in the acute forms. Consequently, as a rule, the simple nitrate of silver is to be preferred, which, when freely diluted (1 in 10,000 to 1 in 500), is generally the most useful injection. Other solutions valuable at this stage of the disease are permanganate of potash (1 in 10,000 to 1 in 2,000) and sulphate of zinc (1 in 1,000 to 1 in 500).

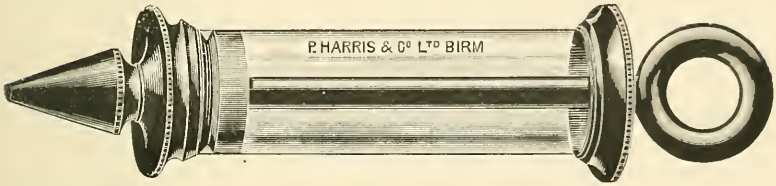

Fig. 28.

Neither Janet's nor Diday's irrigation can properly be administered by the patient himself. Therefore, if for any reason he is unable to have the irrigation frequently performed for him, other measures must be adopted. If the patient is intelligent, I give him a large wound syringe, holding 4 ounces, and fitted with an olive-shaped end (Fig. 28). I instruct him to fill the syringe with the lotion, and to inject the contents *à la Janet* into the bladder. He seldom finds any difficulty in doing this. One or more syringefuls may be injected. The irrigation is to be performed once every day, preferably at night (the strength of the solution being gradually increased), until the urine becomes clear and free from mucus, showing only the presence of urethral threads. The disorder then passes into the second classification.

The Inveterate or Circumscribed Variety.

We will first consider the superficial form, where the mucous membrane alone is involved, and where there is neither a narrowing of the urethra nor an extension of the inflammation to the prostate. A powerful astringent may now be directly applied to the affected spot, and to it only. This may be done in one of several ways. There is, however, no better instrument for this purpose than the endoscope. Having carefully exposed the inflamed area, a strong solution (1 per cent. to 10 per cent.) of nitrate of silver or sulphate of copper may be applied by means of a brush or small swab, all excess of fluid being carefully mopped up. Instead of the endoscope, Guyon's or Ultzmann's syringe may be used. In every case the instrument must be lubricated with glycerine, and not with oil.

Fig. 29.

These strong astringent remedies should not be applied oftener than every second or third day. In the intervals the urethra may be irrigated by Janet's or Diday's method with a mild astringent fluid of permanganate of potash or sulphate of zinc. Two golden rules are to be observed in the use of these injections: Always begin with weak solutions, proceeding gradually to the stronger ones, and allowing the reaction which follows the application to completely die down before repeating the process.

It is occasionally of advantage to apply a remedy which will have a more prolonged and continuous action than the watery injections just mentioned. With this object in view, numerous soluble medicated bougies have been devised which, being introduced into the

urethra, are allowed slowly to dissolve. Their use, however, has not been followed by much success, and as they unnecessarily irritate the healthy portion of the mucous membrane, they are not to be recommended. Where the more continuous action of the remedy is desirable, the drug may be incorporated with lanoline, and applied directly to the inflamed area by means of an ointment introducer (Fig. 29). The lanoline ointment spreads over the mucous membrane and tenaciously adheres to it, and is not readily removed by micturition. A useful formula for such an ointment is nitrate of silver 1 to 5, lanoline 50, vaseline 50.

Lastly may be considered that form of the disorder in which the inflammation has penetrated deeply into the tissues, producing an infiltration of the connective tissue.

The aim here must be to try to induce absorption of the deep-seated induration by means of pressure and dilatation; but the mucous membrane covering the deep induration being inflamed, it also requires treatment, as explained in the two preceding sections.

The value of the dilatation of the urethra in assisting the absorption of an induration has long been recognised, but it has already been pointed out that the mere occasional passage of a bougie (a means usually resorted to) is wholly inadequate. To obtain the full benefit of the treatment the dilatation must be carried out on a rational and systematic plan. The earlier stages of dilatation are best effected by means of steel bougies, beginning with a low number and gradually passing on to the higher. But the bougies in common use are not well suited to the purpose, as they are not sufficiently large, nor is their shape the most desirable. For dilating the anterior urethra, short straight cylindrical bougies are best. For the whole of the urethra, the conical bougies of Dittel or those of

Guyon are most convenient. Instead of stopping at the use of a No. 12 English, as is generally done, it is needful to increase the size up to 18 or 20. But even with the use of these large bougies the urethra cannot be thoroughly dilated, for the largest bougie that the penile portion when stretched to the uttermost will admit is too small to distend either the bulbous or prostatic portion. The narrowness of the meatus may be overcome by an incision, but that would only partially help us. An instrument is needed which, like the urethrometer, can be passed through the narrow portion, and then expanded at will. Such an instrument is provided in the urethral dilators* of Oberländer (Fig. 30), Kollmann (Figs. 31 and 32), and others. These dilators are made in various forms, so that the whole or any part of the urethra can be treated.

The dilators of Oberländer when in use are covered with a thin, tightly-fitting indiarubber sheath, in order to prevent the mucous membrane being caught between the two arms when the instrument is closed prior to its withdrawal. The newer instruments of Kollmann are so constructed that the rubber sheath is unnecessary.

The dilator, after having been well lubricated with glycerine and tragacanth, is passed down to the affected portion of the urethra, and then by means of the screw slowly expanded. The degree of expansion is indicated on a dial. The dilatation must be very gradual, not more than 1 millimetre at a sitting, and must be stopped immediately it occasions pain; it should not give rise to bleeding. After an interval of seven or eight days, and when all reaction has died down, the dilatation may be carried to a fuller degree. After each dilatation the

* These urethral dilators are made in various forms. Figs. 28 and 29 represent instruments designed to dilate the anterior urethra, Fig. 30 the posterior, and Fig. 31 both anterior and posterior.

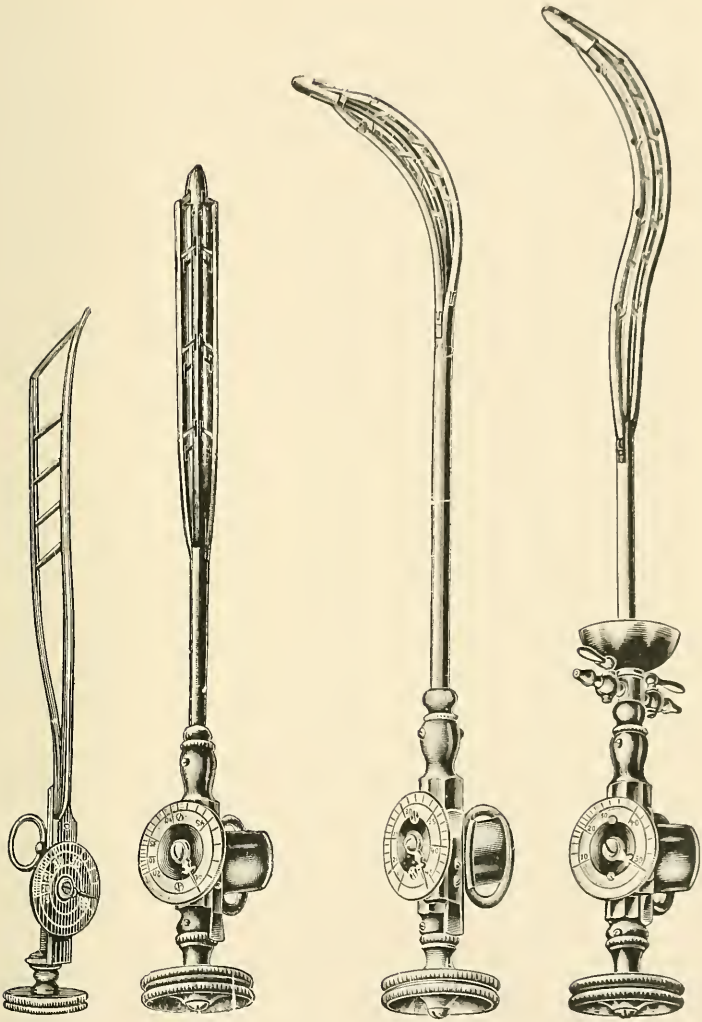

Fig. 30. Fig. 31. Fig. 32. Fig. 33.

urethra must be irrigated with a dilute antiseptic, such as nitrate of silver (1 in 5,000) lotion. In the interval astringent injections, Janet's or Diday's, are to be used.

If these instruments are carefully and reasonably used, avoiding all attempts to unduly hurry the process, and always abstaining from employing them during the inflammatory reaction, they constitute a decided advance in the treatment of the later stages of the disease. Not only does the pressure and dilatation assist the absorption of the inflammatory induration, but it squeezes out the contents of the urethral glands, and liberates any gonococci which may be lurking there.

As long as the secretion contains numerous gonococci instrumental interference of any kind is best withheld, but the presence of a few is not in itself a contra-indication for treatment by dilatation.

Recently Lohnstein has suggested that the irrigation should be performed whilst the folds of the mucous membrane are stretched out by the dilator. For this purpose both he and Kollmann have devised special instruments. Fig. 33 represents Kollmann's latest improvement.

The combination of irrigation and dilatation is especially indicated where, as shown by the urethroscope, the urethral glands and follicles are markedly affected.

It is advisable in all cases to begin the dilatation treatment with the use of the bougies, as they cause less irritation to the urethra than the dilators do. If the meatus is moderately wide the passage can generally be dilated without discomfort up to No. 26 or 27, and often to No. 30 (French scale). In many cases it is unnecessary to use the dilators at all, as the degree of expansion obtained by the large bougies is sufficient to bring about a cure. The progress of the case should be controlled from time to time by a microscopic examination of the secretion and the use of the urethroscope.

Summary of the Treatment of Chronic Urethritis.

It may be convenient briefly to summarize the treatment which has been advocated in the preceding pages.

The first essential is the formation of an exact diagnosis, so that the extent and character of the inflammation to be treated may be clearly appreciated.

In the absence of any contra-indication, such as an acute complication, the treatment is begun by irrigating the entire urethra (Diday's method) once a day with a warm dilute solution of nitrate of silver (1 in 10,000) or of permanganate of potash (1 in 8,000). If this is well tolerated, the strength of the solution may be cautiously increased; and a little later it may be of advantage to change Diday's method of irrigation for the more powerful one of Janet. The beneficial effect of this treatment is seen in the clearing of the urine through the disappearance of the cloud of mucus and the diminution in the number and size of the urethral threads. Should the symptoms point to the prostate being involved, then, in addition to the urethral irrigations, this gland should be gently massaged two or three times a week. As the urine clears under this treatment the strength of the irrigating solutions may be increased. When the urine is quite clear from mucus, and only shows the presence of urethral threads, stronger solutions (preferably of nitrate of silver 1 per cent. to 10 per cent.) may occasionally be applied directly, and as far as possible solely, to the inflamed areas by means of the urethroscope, or Guyon's or Ultzmann's syringe.

Should the instrumental examination of the urethra reveal any narrowing of its lumen or other indication of the involvement of the submucous tissues, steps must be taken to restore the lumen of the canal and to induce absorption of the induration. To this end the urethra

should be systematically dilated, at first by means of bougies, and later, if necessary, by some form of dilator. Unless the narrowing of the urethra is considerable—a true stricture being present—the dilatation should not be begun until the irrigation treatment has subdued the general catarrhal condition of the mucous membrane, leaving the urine clear and the secretion free from gonococci. The dilatation is performed about once a week. After it the urethra should be irrigated with a very weak astringent antiseptic, and in the intervals Janet's injections employed.

PART II.

THE COMPLICATIONS OF GONORRHŒA

CHAPTER I

MINOR COMPLICATIONS

(Balanitis—Para-urethral Canals—Papillomata—Folliculitis Urethralis—Inflammation of Cowper's Gland—Lymphangitis and Lymphadenitis)

Balanitis.

Balanitis is the term applied to an inflammation of the mucous membrane covering the glans penis and lining the prepuce.

Although balanitis is frequently met with in connection with gonorrhœa, it is not, perhaps, strictly speaking, a complication of that disorder, as it is not caused by the action of the gonococcus, and frequently arises quite independently of it.

Almost any kind of irritation of the end of the penis may give rise to balanitis, but by far the most common source of irritation is one which is caused by the retention and decomposition of the smegma secretion behind a tight foreskin. There are many other forms of irritation, such as a soft sore, a hard chancre, epithelioma, herpes, and eczema, which also may give rise to balanitis, but in almost all these cases there will also be found an

accumulation of smegma beneath a long and tight foreskin. The occurrence of balanitis in connection with gonorrhœa is to be attributed to the additional irritation produced by the urethral discharge retained and decomposing behind a long prepuce. It is certainly seldom that the gonococcus directly causes the balanitis.

Symptoms.—The inflammation of the glans produces an itching and soreness of the end of the penis, which becomes red, swollen, and œdematous, and from beneath the foreskin a free and intensely fœtid discharge exudes. If the prepuce be withdrawn, the mucous membrane lining it and covering the glans will be found to be inflamed and often ulcerated in places. The inflammation may become so intense as to cause gangrene of the tissues. This is generally limited to the prepuce, but may involve a considerable portion of the integument of the penis.

There is always a certain amount of phimosis present, and, should repeated attacks of balanitis occur, the prepucial opening is likely to become so thickened and contracted as to render it difficult or impossible to uncover the glans. Should such a phimotic foreskin be forcibly retracted over the glans, the condition known as paraphimosis results. The constricted orifice of the prepuce tightly encircles the glans, and obstructs the return of the blood by the veins. This causes the end of the penis to swell, and the mucous membrane of the foreskin which lies in front of the constricting ring becomes greatly distended with serous exudation, and may, if unrelieved, become gangrenous.

Diagnosis.—The diagnosis of balanitis rarely presents any difficulty, save where marked phimosis prevents the inspection of the meatus and glans.

A small quantity of the pus exuding from under the prepuce should be smeared on a glass slide, and examined

microscopically for the presence or absence of the gonococcus. The prepucial sac should then be thoroughly cleansed by irrigation with a dilute antiseptic solution. The patient is then allowed to pass water into a glass, when, if the urine is turbid, it shows that urethritis is present as well as balanitis. Whether the gonococcus be present or not, the glans should be carefully examined for soft sores or syphilitic chancre.

Treatment. — The prepucial sac should be gently cleansed from all secretion with warm water, and then irrigated with a mild astringent antiseptic solution, such as nitrate of silver (1 in 5,000). This should be repeated several times a day. If the foreskin can be withdrawn, a thin layer of gauze soaked in the lotion should be interposed between the glans and the prepuce. Later, when the secretion is lessened, the lotion may be replaced by an astringent dusting-powder, such as oxide of zinc. When the phimosis prevents the glans being uncovered, the parts must be cleansed and irrigated by means of a wound syringe, the nozzle of which is inserted under the prepuce. Where there is much œdema and cellulitis present, evaporating lotions and wet dressings may be applied to the penis. In cases of severe cellulitis, where gangrene threatens, the prepuce should be circumcised or divided by a free dorsal incision.

Para-urethral Canals.

A careful examination of the penis, more especially in the neighbourhood of the frenum and meatus, will frequently detect one or more fine blind canals or diverticula of from $\frac{1}{4}$ to $\frac{3}{4}$ inch in length, and just wide enough to admit a fine probe. These canals are lined by squamous epithelium, and may be regarded as fine invaginations of the skin. They are of interest from the fact that occa-

sionally they become inoculated with gonorrhœa, and may retain the infection long after the urethritis is healed, or, by closure of the mouth of the canal, may give rise to a small abscess.

Treatment. — Should the injection of the canal with nitrate of silver solution prove insufficient to cure the inflammation, the canal should be destroyed by means of a fine galvano-cautery point; or it may be laid open by means of an incision, and the wound allowed to heal by granulation.

Internal Para-urethral Canals.

Less common, though more important, are similar canals which open into the lumen of the urethra near the meatus. Obviously, such canals are peculiarly liable to become the focus of a chronic urethritis, and from their situation are likely to be overlooked. Their detection and treatment require the use of the urethroscope.

Papillomata.

It frequently happens that numerous small warts develop on the mucous membrane and skin of the genitals of persons suffering from gonorrhœa. These warts are true papillomata, and develop in consequence of the irritation which decomposing pus, more especially gonorrhœal pus, produces on the skin and mucous membrane, which is constantly bathed by it.

These warts most frequently grow from the mucous membrane covering the glans penis, more especially about the corona, but they are also found on the integument of the penis, the scrotum, the anal region, and the inner part of the thighs, and occasionally within the urethral canal.

In the female they are met with springing from the mucous and cutaneous surface of the vulva and perinæum.

The warts may be single, but usually are multiple, and vary in size from that of a pin's head to large cauliflower-like growths. Their appearance and consistency differ considerably, according to their situation. If growing from the mucous membrane, where they are kept moist, the epithelium covering them is thin and delicate, so that they readily bleed on being touched. In other drier situations they become covered with a hard and horny epithelium.

Histologically these growths are true papillomata. The papillæ of the integument are greatly hypertrophied and œdematous, and are covered by a thickened layer of epithelium. They therefore in no way structurally resemble the small-celled infiltration of the syphilitic condylomata, with which they are sometimes confounded.

Apart from the fact that they grow in situations where the integument is exposed to the irritating and macerating action of fœtid discharges, it is not known what gives rise to them. It has been supposed that the growth is the result of a specific micro-organism, but the proof of such an assumption is wanting.*

Treatment.—There is seldom any difficulty in effectually dealing with this condition. The irritating discharge must be treated and the affected part kept scrupulously clean. In many cases this is all that is necessary to cause the warts to shrivel up and disappear. If they persist they may be touched occasionally with a strong alcoholic solution of perchloride of mercury, and kept dusted with an astringent powder, such as alum, oxide of zinc, or resorcin. Larger growths are best removed with the knife or scissors, and the base should be touched with the cautery to arrest the hæmorrhage.

* Unkovsky, *Wratsch*, Nos. 14 and 46, 1885.

Peri-urethral Inflammation and Abscess (Folliculitis Urethralis).

In speaking of the pathology of chronic urethritis, attention has been drawn to the frequency with which the small glands and crypts of Littré and Morgagni become the foci of gonorrhœal inflammation. At times, through the blocking of the duct of the gland, or from other causes, the gonococci invade the periglandular tissue, and give rise to an inflammation outside the urethra, in the cavernous tissue (peri-urethal infiltration), which is apt to develop into a small abscess. As a rule, such infiltrations and abscesses are quite small—from the size of a millet-seed to a pea—and are situated about the floor of the penile urethra. Occasionally the infiltration is much larger, so that a considerable portion of the corpus spongiosum or cavernosum is involved. Should such an infiltration resolve, it leaves a fibrous induration or sclerosis, the subsequent contraction of which may give rise to considerable distortion of the penis. On the other hand, the infiltration may proceed to the formation of an abscess, which may either burst into the urethra or the under surface of the penis. In the latter case a troublesome urinary fistula may be caused.

Symptoms.—The small infiltrations and abscesses frequently give rise to no special subjective symptoms, beyond a slight local pain on micturition or erection. Careful palpation of the penis may detect one or more tender spots, generally below or to one side of the urethra. Pressure over the tender spot may express a bead or two of pus, which appears at the meatus. The presence of a large induration in the corpus cavernosum, or spongiosum, produces a considerable distortion of the penis, especially on erection, the organ being curved towards the affected

part. In the early stages of the inflammatory infiltration into these tissues an erection is accompanied by chordee venerea, causing severe pain. Later, when the infiltration has become indurated, no pain is felt, but the distortion of the penis may prove an obstacle to coitus.

Treatment.—As soon as a periurethral infiltration is detected, all local urethral treatment should be suspended, or, at any rate, reduced to a minimum. For the prevention of the painful chordee chief reliance is to be placed on free purging, light diet, and rest in bed. Cold-water dressings may be applied locally, and full doses of bromide of potassium given by the mouth. Later, in order to assist the absorption of the infiltration, the indurated area may be rubbed with iodine vasogen or mercurial ointment. Should an abscess form subcutaneously, it should be early incised.

Inflammation of Cowper's Gland.

Occasionally the small glands of Cowper, which are situated in the perinæum on either side of the urethra, become inflamed. When this happens a firm, painful swelling, about the size of a pigeon's egg, forms in the perinæum, midway between the scrotum and anus. Should the inflammation proceed to the formation of an abscess, the swelling increases in size until it impedes, more or less, the passage of urine and renders defæcation painful. The skin over it becomes red and acutely tender. If unrelieved, the abscess generally bursts externally, but may do so into the urethra, or, more rarely, into the rectum. The treatment consists in the application of hot fomentations to the perinæum, to relieve the pain in the early stages, and the free opening of the abscess from the perinæum as soon as pus is detected. It is undesirable to delay the opening of these abscesses, as otherwise they

may burst into the urethra or rectum, and give rise to troublesome sinuses.

Lymphangitis and Lymphadenitis.

In almost every case of acute gonorrhœa where the symptoms are at all severe the inguinal lymphatic glands will be found to be slightly swollen and tender. Generally this lymphadenitis soon subsides, and hardly calls for special treatment. More rarely the inflammation is of a severer type, causing considerable distress, and proceeding eventually to the formation of one or more abscesses or buboes. This lymphadenitis may or may not be accompanied by an inflammation of the cutaneous lymphatic vessels (lymphangitis) of the penis. When such is the case, faint, thin, red lines are seen in the skin of the penis, running from the glans towards the pubes. If the penis be palpated, these inflamed lymphatic vessels can be felt as firm cords, about the size of a steel knitting-needle. The presence of these inflamed lymphatics may give rise to various distortions of the penis, as in chordee.

Treatment.—Rest and the application of evaporating lotions, or glycerine and belladonna, to the inflamed parts is, as a rule, all that is called for in these cases. Should an abscess form, an incision to evacuate the pus is indicated.

CHAPTER II

EPIDIDYMITIS

Next to prostatitis, the most frequent complication of posterior urethritis is an inflammation of the epididymis. This complication occurs in from 10 to 30 per cent. of all cases of urethritis. It is found, as we might expect, far more commonly in hospital practice than privately. There can now be little doubt that epididymitis is due to a direct extension of the gonococcal inflammation of the posterior urethra by means of the vas deferens. In the majority of cases this infection would seem to be a pure gonococcal one, though it may be a mixed infection. The exciting cause of this disorder is to be sought for in anything which may give rise to an exacerbation of the urethritis, and so further its extension to the posterior portion of the urethra. Violent bodily exercise, *excesse in Baccho et venere*, instrumental examination or irritating injections are all apt to be followed by the sudden development of epididymitis. Not infrequently the treatment of the urethritis, more especially the injections, is blamed as giving rise to the epididymitis. That this is often unjust was shown by Le Fort, who demonstrated that it was in the untreated cases of urethritis that this complication was most common.

Out of 576 cases of epididymitis, 264 had been untreated, 73 treated by balsams, 82 treated by injections,

60 treated by balsams and injections, and in 97 the treatment was unknown.

Epididymitis most commonly develops during the third or fourth week of a urethritis, that being the most usual time for posterior urethritis to appear; but it may occur at any period, from the earliest onset of the acute disorder to late in the chronic condition. It attacks either gland with almost equal frequency. In a small percentage of cases (5 per cent., Castelnau) both glands may be affected simultaneously.

Symptoms.—The inflammation generally begins suddenly. The patient experiences pain, without any warning, in one of the testicles, which he finds to be swollen and acutely tender. Both the swelling and the pain rapidly increase. The inflammation is principally confined to the epididymis, more especially the globus major, but the gland proper also suffers to a greater or less degree. A serous or sero-purulent fluid, in which gonococci may often be detected, distends the tunica vaginalis. If the inflammation is severe, the scrotal integuments become thickened and œdematous, the small folds obliterated, and the surface red and glistening. There is usually some amount of fever present, and a feeling of nausea and even vomiting may be caused by the severity of the pain. This is the most severe when the spermatic cord is also involved in the inflammation (funiculitis). In such cases the whole cord is swollen, firm, and acutely tender. More rarely the vas deferens alone is involved, the other constituents escaping. The acute attack reaches its height in from four to five days, and then soon begins to decline. The effusion into the tunica vaginalis becomes absorbed, and so considerably reduces the size of the scrotal swelling. The swollen gland and epididymis slowly resume their natural size, though many weeks, or even months, may

pass before this is completely effected. Although absolute restitution may take place, as a rule one or more small indurated nodules in the epididymis permanently persist. During the acute stage of the disease the urethral secretion greatly diminishes, so that the patient no longer notices its presence. This fact, though well known, is a constant trap to the medical student, who diagnoses traumatic orchitis because the urethra is free from discharge. As the acuteness of the epididymitis subsides, the urethral secretion reappears. Although epididymitis generally develops in an acute manner, occasionally it is the very reverse, and the whole course of the disease may be so mild as barely to attract the notice of the patient to this complication. The inflammation, like most gonorrhœal troubles, is liable to severe relapses at any period, and it may happen that just as one gland is recovering the other is attacked.

Diagnosis.—It is but rarely that any difficulty is experienced in making the diagnosis of gonorrhœal epididymitis. The acuteness of the early symptoms distinguishes it from syphilitic and tubercular orchitis. Moreover, apart from the history of the case, and the presence of syphilitic or tubercular lesions elsewhere, the character of the swelling is different; for the enlargement of the gland and epididymis in urethritis is of a smooth and uniform nature, whilst the tubercular affection is generally limited to the epididymis, and is nodular in character. Syphilis usually attacks the organ proper, and is seldom confined to the epididymis. Perhaps the most frequent mistake made in diagnosis is the result of accepting naïvely the patient's statement that the swelling is due to a knock or strain. All doubt as to the origin of the inflammation is generally settled at once by directing the patient to make water, preferably into two glasses,

when the presence of pus, threads, or mucus in the urine will at once proclaim its true nature. An acute epididymitis in an undescended gland may lead to a diagnosis of strangulated inguinal hernia or acute adenitis.

Prognosis.—Apart from rare instances where the acute inflammation has spread to the peritoneum or has given rise to intra-abdominal abscess, the prognosis as regards life is certainly good. But it is far graver when we regard the functional activity of the gland. Attention has been drawn to the frequency with which an indurated nodule or sclerosed area persistently remains as the result of the acute inflammation. Such an induration, especially if situated in the globus minor, is very apt to reduce or occlude the lumen of the seminal canal, and so hinder the passage of the seminal fluid, thus leading to oligospermia, if not azoospermia. The danger of such after-troubles is naturally very much greater in cases of double epididymitis, though sterility does not necessarily follow even here. According to Benzler, the total sterility (complete sterility and one child sterility taken together) in cases of single epididymitis = 36·9 per cent., and that of double epididymitis = 63·5 per cent.

Treatment. — A point of primary importance to be observed on the onset of epididymitis is that all local treatment of the urethritis be at once suspended. Whilst this complication is in its acute stage all injections or other topical applications will only aggravate the trouble. Even when the pain has gone and the swelling is disappearing it is a grave mistake to be in a hurry to recommence the local treatment. During the acute stages we must rely upon the internal administration of the balsams, or, better, salicylate of soda, in order favourably to influence the urethral inflammation. As regards the treatment of the epididymitis itself, our task is first of all to relieve

the severe pain, and then to assist the absorption of the inflammatory products as speedily and as completely as possible. Whenever practicable, the patient should be kept in bed, for it is only thus that the parts can be adequately rested. 'Rest in bed' is certainly the most valuable advice we can give to our patient, and neglect of it often leads to dire pains and penalties.

If the patient is unable to remain in bed, the testicles should be raised and supported by the application of a suitable suspensory bandage. There is no lack of such bandages on the market, but the majority of them are useless for this purpose. The bandage must be so constructed as not only to allow the testicles to be raised, but also to be drawn up against the body. The purse of the bandage must be large enough to take a thick padding of wool, and must be so adjustable as to permit of a proper degree of pressure. A thoroughly serviceable one is that devised by Neisser (see Fig. 34), but a fairly efficient one can be readily fashioned out of a common triangular bandage.

In the earliest stages of this complication the pain is perhaps best relieved by the application of cold to the part. The scrotum and groin are enveloped in absorbent gauze, which is kept moist by some simple evaporating lotion. This can only be done efficiently when the patient is lying in bed, with the scrotum supported by a small cushion placed between the thighs. In the later stages, and always if the patient is getting about, the pain is better relieved by warm anodyne applications.

Of these I do not think there is any better than the glycerine and belladonna of the English Pharmacopœia applied in the following way: The groin and scrotum on the affected side are thickly smeared with the preparation, and then covered with a fold of absorbent gauze, which

has been wrung out of hot water. Over this is laid a piece of gutta-percha tissue, and then a thick layer of wadding. The whole dressing is retained in its place, and the testicle elevated and gently pressed against the body by a well-fitting suspensory bandage (Fig. 34). A more cleanly application is that of antiphlogistine (a patent mixture of infusorial earth, glycerine, and antiseptics),

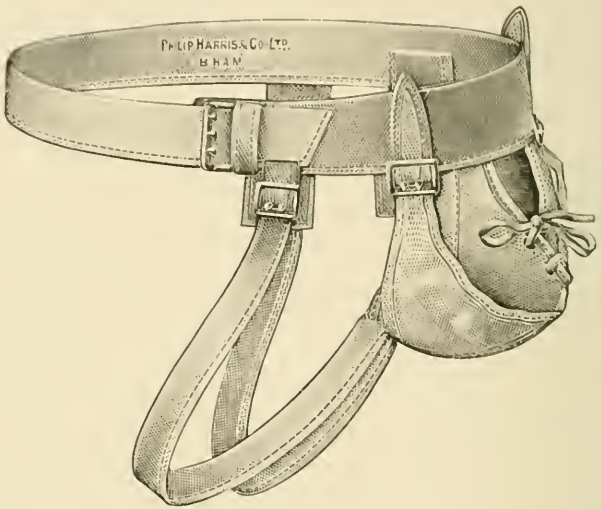

Fig. 34.—Suspensory Bandage.

which I have found convenient and efficacious. When the pain is exceedingly severe it may be relieved by the administration of morphia.

Under the above treatment the acute symptoms generally abate within a few days. The pain and discomfort disappear, and the swelling gradually subsides. The absorption of the inflammatory products is materially hastened by gentle pressure applied to the part. At first this is best done by means of the suspensory bandage, but later, when all tenderness has disappeared and the swelling is limited to the epididymis, it is generally

advised to apply the pressure by means of firm strapping. It is, however, far from easy to strap a testicle so as to obtain the right degree of pressure, and a well-applied bandage is quite as efficacious and much more agreeable to the patient.

In addition to the application of pressure to the testicle, iodide of potassium may be given internally, and applied locally in the form of an ointment, with a view to aid the absorption of the infiltration. On those rare occasions where an abscess forms in the epididymis it must be treated on general surgical lines, viz., opened freely, and packed with gauze until completely healed.

Lastly, it must be remembered that the posterior urethritis which gave rise to the epididymitis will require appropriate treatment.

CHAPTER III

PROSTATITIS

Acute Prostatitis

When in the course of an acute gonorrhœa the inflammation spreads to the posterior urethra (as it does usually about the end of the third week), it almost of necessity involves the prostatic gland, giving rise to a purulent catarrh of its numerous mucous follicles. This *acute follicular or catarrhal prostatitis* is limited to the mucous membrane, and gives rise to no symptoms beyond those of acute posterior urethritis, already described. Usually, under appropriate treatment, the inflammation readily subsides; but occasionally, in consequence, perhaps, of some indiscretion of diet or hygiene, the inflammatory action spreads to the interstitial substance of the prostate, and so gives rise to an acute diffuse or parenchymatous prostatitis.

Here the inflammation spreads from the mucous membrane deep into the substance of the prostate, and there, between the glandular elements, forms numerous small yellow infiltration foci, which either develop into minute miliary abscesses or coalesce so as to form one large collection of pus. In specially severe cases the inflammation may spread to the periprostatic cellular tissue, forming a diffuse pelvic phlegmon of a most serious character. The symptoms evoked by an acute parenchy-

matous prostatitis vary according to the seat and severity of the inflammatory process. As a rule the onset is decidedly sudden, the patient experiencing a feeling of weight and uneasiness about the rectum and perinæum, as though there were a foreign body in the bowel; the desire for micturition becomes distressingly frequent, though the urine is passed with increasing difficulty and pain; retention of urine is not uncommon. The temperature rises rapidly, and general feverish symptoms are present. Per rectum the prostate can be felt to be greatly swollen, hot, and acutely tender. Under appropriate treatment the inflammation usually resolves, but occasionally proceeds to suppuration, and the abscess, if untreated, after a longer or shorter time, bursts into the urethra or rectum, or, rarely, opens externally through the perinæum.

In the phlegmonous form all these symptoms are greatly exaggerated. The temperature is high and often accompanied by severe rigors. On examination per rectum the outline of the prostate is not readily felt, on account of a diffuse boggy or fluctuating swelling occupying the anterior wall of the rectum.

As soon as this complication is suspected all local treatment of the urethritis must be suspended; the patient must be kept in bed, on a low diet, and the congestion of the lower part of the bowel relieved by a mild purgative. For the relief of the pain and tenesmus heat should be applied to the perinæum by means of large poultices or frequent sitz-baths, or hot-water enemata may be given. For severe pain belladonna or morphia suppositories are valuable. If the urinary retention persists in spite of morphia and hot applications, the water must be drawn off with a soft rubber catheter. As soon as an abscess is detected it should be opened, the incision being made

through the perinæum by choice, but in the rectum if the abscess should point there.

Before incising such an abscess through the rectum it is advisable to irrigate the lower part of the bowel with a 1 per cent. protargol solution, with a view to preventing a possible gonorrhœal infection of the rectum.

Chronic Prostatitis.

It is necessary now to draw attention to this frequent, though rarely recognised, complication, a condition which has, perhaps, more influence in keeping up the chronic urethritis than any yet discussed. Chronic prostatitis generally develops insidiously during the course of a chronic urethritis, less frequently as the continuation of an acute prostatitis. It arises as one of the consequences of the gonorrhœa spreading to the posterior urethra and infecting the prostatic glands. *A chronic desquamative catarrh* of these glands is set up, which has little or no tendency either to spread to the parenchyma of the prostate or to the formation of an abscess.

As this condition evokes no very characteristic symptoms, its existence has not received wide recognition; consequently, there are few statistics from which a definite statement as to its relative frequency can be determined. Still, there is already sufficient evidence to show that chronic prostatitis is an exceedingly common complication of chronic urethritis. Indeed, it will not be overstating the case to affirm that it is more commonly present than absent in all cases of urethritis of more than three months' duration.*

* In a hundred cases of chronic urethritis examined by Casper, the prostate was found to be inflamed in 85 per cent. ('Monatsberichte über Harn und Sexual-apparates,' 1900). M. V. Zeissl (*Wiener*

The importance of this disease lies not so much in the symptoms it creates as in the difficulty with which it is eradicated. Long after the gonococci have disappeared from the urethral secretion they can frequently be found in the expressed prostatic secretion. And so long as a focus of gonorrhœal inflammation persists in the prostate, the patient is naturally liable to a recurrence of the urethritis. Hence the importance of examining the prostatic secretion before dismissing the patient as definitely cured.

Symptoms.—Chronic catarrhal prostatitis gives rise to no very characteristic subjective symptoms. The diagnosis rests almost solely upon the microscopical examination of the secretion. The patient usually presents the ordinary symptoms of chronic posterior urethritis — a slightly increased frequency of micturition, and some sexual irritability or disturbance, a feeling of weight and oppression about the neck of the bladder, and threads may be traced in the second portion of the urine. Often the most marked symptom is a grave disturbance of the general nervous system. The patient becomes very hypochondriacal, and highly exaggerates his symptoms and the severity of his complaint, and he is very apt to develop into a chronic sexual neurasthenic.

All subjective symptoms may, however, be, and frequently are, entirely absent; and it is not until the prostatic secretion is examined that the disease is recognised. For the purpose of microscopical examination the prostatic fluid is best obtained by first instructing the patient to pass water, so as thoroughly to clear the urethra from its secretion, then, while the patient kneels on a couch.

Klinik, 1902) is of opinion that prostatitis is almost an invariable accompaniment of a protracted gonorrhœa. See also Posner, Seventh Congress für innere Medicin, 1889.

gently stroking the prostate from behind forwards by means of Feleki's instrument, or better, by the index finger of the surgeon, protected by a rubber glove. The prostatic fluid pressed from the gland passes down the urethra, and is collected at the meatus in a watch-glass. Other methods of obtaining the secretion have already been described (see p. 78).

The normal prostatic secretion is a thin, milky fluid of a faintly acid reaction, and having the characteristic

Fig. 35.—Sperm Crystals.

spermatic odour. Under the microscope the fluid is seen to consist principally of numerous small, highly refractive lecithin bodies, with some polygonal and cylindrical epithelial cells, and here and there a laminated amyloid body. A characteristic feature of the prostatic fluid is the presence of long needle or whetstone shaped crystals, the so-called sperm crystals of Böttcher or Charcot (Fig. 35). In order to demonstrate these crystals the prostatic fluid must be obtained free from any admixture of urine. A drop of the secretion is mixed with a drop of 1 per cent. solution of phosphate of ammonia, then slowly dried under the protection of a cover-glass. After some little time the

crystals may be seen in large numbers. Should the prostate be inflamed, in addition to the normal cellular bodies, there will be seen pus cells in large and overwhelming numbers, and perhaps micro-organisms will be present also. The frequency with which gonococci are found in the secretion of chronic prostatitis is variously stated by different authorities. Neisser believes that the gonococcus is almost always present; Cohn and Wossildo, on the other hand, hold the opposite opinion. Personally, I have only found the gonococcus in the secretion of recent chronic prostatitis, and never in that of long standing. In such cases the micro-organism most frequently present is the staphylococcus. In case of doubt whether the fluid examined is really prostatic secretion or not, the demonstration of the sperm crystals will be conclusive of its prostatic origin.

If the urethra is examined with the endoscope the mucous membrane of the prostatic portion will be found to be swollen and hyperæmic. The verumontanum is seen to be especially swollen, and projects into the lumen of the endoscopic tube as a large red globular body, bleeding at the slightest touch.

Treatment.—The treatment for chronic prostatitis is the same as that for chronic posterior urethritis, with certain additional measures. First and foremost is the systematic and gentle massage of the prostate twice or thrice a week. An effect of the massage is to express the contents of the distended prostatic glands and ducts into the urethra, and so to permit the astringent fluids afterwards used to come directly into contact with the inflamed parts. In addition to unloading the over-distended ducts and mucous glands, the massage promotes the absorption of the inflammatory œdema and stimulates the muscular fibre of the prostate.

Following the massage, injections or instillations of astringent lotions are to be given. As long as bacteria are present injections of protargol or permanganate of potash are indicated. These are to be replaced, as the micro-organisms disappear, by the more astringent solutions of nitrate of silver and sulphate of copper. Care must be taken that the massage be gently performed, as sometimes the gland is very sensitive; and should signs of irritation follow, its use must be suspended for a time. *This massage of the gland followed by astringent applications is the cardinal treatment for chronic prostatitis.* There are, however, certain subsidiary measures which may be employed with advantage, such as the use of small rectal injections of iodide of potassium, the internal administration of ergot, and the employment of ichthyol in the form of suppositories.

Under this treatment the urinary threads will be found slowly but steadily to diminish, both in number and in size, and on microscopic examination the pus cells will be seen gradually to disappear.

Throughout the treatment of chronic prostatitis careful attention should be paid to the patient's general health. Tonics, change of air, sea-bathing, and hydropathic treatment in general are valuable means of not only improving the tone of the body, but of diverting the mind, and so relieving the great depression.

After the treatment recommended has been pursued for several weeks it will be found in a large proportion of cases that all the pus cells have disappeared, and that the prostatic fluid has assumed its normal character. Yet it cannot be denied that in a not inconsiderable number of cases, in spite of the most prolonged and careful treatment, a few pus cells may occasionally be seen. But as there is evidence to show that the occasional presence of a few of

these cells in the prostatic secretion is not of grave consequence, I believe we shall be studying the best interests of our patient if we content ourselves with this apparently imperfect result, rather than, by too prolonged local treatment, run the risks of converting him into a confirmed sexual neurasthenic.

CHAPTER IV

SPERMATO-CYSTITIS

Although an extension of the gonorrhœal inflammation to the vesiculæ seminales is a much rarer complication than either prostatitis or epididymitis, it certainly occurs more frequently than is commonly suspected. In the milder forms it is liable to be entirely overlooked, and in the severe cases to be mistaken for prostatic inflammation, especially as spermato-cystitis is generally associated with prostatitis. Authorities differ greatly in their estimate of the frequency of the occurrence of this complication. Columbini puts it at over 60 per cent., whilst Petersen ('Verhandl. d. Deutsch. dermatol. Gesellsch.,' IV. Congress, 1894), who specially examined 200 patients on this point, places it as low as 4 per cent.

Clinically, two forms of the disease are recognised—(*a*) an acute inflammatory, and (*b*) a chronic catarrhal spermato-cystitis.

(*a*) **Acute Spermato-Cystitis.** — The acute form may develop at any period in the course of a posterior urethritis, the infection spreading along the ejaculatory duct to the mucous membrane lining the seminal vesicle. An acute catarrhal inflammation is set up, and the vesicle becomes distended with a muco-purulent secretion, which, under unfavourable circumstances, may proceed to the formation

of matter—empyema of the vesicle, which, if unopened, the matter may burst into the urethra, rectum, bladder, or, rarely, into the peritoneal cavity. Generally, however, the catarrhal condition does not proceed to the formation of an abscess, but either resolves completely or, more frequently, passes into the chronic catarrhal condition.

Symptoms.—The subjective symptoms which such a condition evolves, though exceedingly distressing, are rarely sufficiently distinctive to render an exact diagnosis possible. The most characteristic symptom is the frequent and often painful emission of sanguineous and purulent seminal fluid, which leaves gray spots on the linen, surrounded by a yellow or brown ring.

Apart from this, the symptoms are not very characteristic, and are common to acute posterior urethritis and prostatic abscess — viz., frequent painful micturition, accompanied by much bladder and rectal tenesmus, and a feeling of the presence of a foreign body in the rectum, also by increased sexual excitability, accompanied by priapism and the above-mentioned seminal emissions. Some degree of fever, with its accompanying general disturbance, is usually present. As a rule only one vesicle is affected, and the infection is apt to spread along the vas deferens and give rise to a concomitant epididymitis. On examination per rectum, a tender, fluctuating, sausage-like swelling can be felt above the prostate in the situation of the vesicle. Pressure on the swelling expresses per urethram a mixture of pus and semen, which, when microscopically examined, shows the presence of spermatozoa, leucocytes, and gonococci, and often other septic organisms. On this examination the diagnosis of acute spermato-cystitis rests.

(*b*) **Chronic Catarrhal Spermato-Cystitis.** — Here again it is hardly ever possible to diagnose the condition from the subjective symptoms alone, as they are merely

those of chronic posterior urethritis. Nor does a simple digital examination of the rectum afford much help, as the vesiculæ are seldom markedly indurated or enlarged. The diagnosis is made or excluded by the careful microscopic examination of the expressed contents of the vesiculæ. To obtain this free from prostatic and urethral contamination, the prostate is first massaged, and the patient then empties the bladder, so as to remove the secretion expressed from the prostate and any that may be present in the urethra. The contents of the vesiculæ are now squeezed out either by means of the finger, or, better, by Feleki's masseur (p. 78). The expressed contents, more especially the sago-like globulin bodies, are then microscopically examined for pus cells and gonococci.

Treatment. — The treatment of spermato-cystitis, whether in the acute or chronic condition, is almost identical with that of prostatitis in the corresponding stage. Thus, the acute condition is treated by rest in bed, light diet, and gentle purgation. The urine is kept acid and antiseptic by the internal administration of such drugs as salicylate of soda or salol. The painful bladder and rectal tenesmus is relieved by hot-water enemata and sitz-baths, and by the use of belladonna suppositories. Should an abscess form, it must be freely opened, preferably from the perinæum, by a para-rectal incision.

In the subacute and chronic stages, the massage of the vesiculæ and prostate two or three times a week is indicated, to be followed by urethral irrigation with mild antiseptic and astringent solutions. Later, iodide of potassium or ichthyol suppositories may be used to promote absorption of the inflammatory induration.

CHAPTER V

CYSTITIS

Our views on cystitis have undergone considerable modifications during the last few years. We have now learnt that many of the cases which were formerly described as cystitis were incorrectly so termed, for the chief seat of the inflammation has been found to be the membranous and prostatic portions of the urethra, and not the bladder as was then thought. It is not surprising that this mistake was, and is still, frequently made, for, as we shall see, the subjective symptoms of both posterior urethritis and cystitis are very similar. And, moreover, it must be remembered that when the posterior urethra is affected, the inflammation does not usually stop abruptly at the internal vesical sphincter, but also to a slight extent affects the lowest portion or so-called neck of the bladder. For this reason I do not think it wise to attempt, as several writers have done, to distinguish those cases of posterior urethritis in which the neck of the bladder is also involved as a separate class under the term 'urethro-cystitis' or 'cystite du col.'

Posterior urethritis has already been fully discussed, so it is here unnecessary to say more on that subject than that it has been ascertained to be by far the most common of all the complications of urethritis. It now remains for

us to consider that form of inflammation in which the whole or greater part of the mucous membrane of the bladder is involved—true cystitis. Until recent years, this had always been regarded as one of the most common complications of urethritis. But as more exact methods of examination have enabled us to distinguish between a true cystitis and a urethro-cystitis or posterior urethritis, we find that, while the latter is very common, the former is comparatively rare, and that while cystitis is not a very frequent complication of urethritis, yet, when cystitis is found, it is most frequently attributable to urethritis. Indeed, it is hardly an exaggeration to say that an acute inflammation of the bladder occurring in a young or middle-aged man is almost invariably a direct or remote consequence of a pre-existing urethritis. Cystitis may arise in all stages of the disease, both the acute and the chronic. When it occurs during an acute attack it usually does so by direct extension from the posterior urethra in the third or fourth week. An earlier onset is generally due to a direct inoculation of the bladder, in consequence of instrumental manipulation. When cystitis arises in the chronic stage, it may develop during one of the frequent exacerbations of the urethritis which are so common a feature of the disease, or it may be an effect of a stricture of the urethra. Although the bladder becomes inflamed in consequence of direct extension of the urethral inflammation, it is comparatively of rare occurrence that the infection is a pure gonococcal one. Far more frequently it is a mixed infection, in which the bacterium coli or staphylococcus predominates.

Pathology.—The first effect of an infection of the bladder is to produce a general hyperæmia and swelling of the mucous membrane, especially in the region of the trigonum. Should the infection be severe, this is followed

by a free desquamation of the epithelium and the migration of leucocytes. The urine becomes cloudy from the presence of mucus, pus, and epithelial cells, in addition to the phosphatic salts. As the inflammation proceeds the mucous membrane acquires a slate-gray or brownish-red colour; it is swollen and infiltrated with leucocytes. Larger or smaller abscesses may then develop in the bladder walls, and ulcers appear on the surface of the mucous membrane. In the severest types, more or less extensive sloughing of the mucus and even of the muscular coats may take place.

Symptoms.—The cystitis which arises as a complication of gonorrhœa rarely affects the whole of the bladder, but is usually confined to the lower portion, about the internal urethral orifice and trigonum, and is almost invariably associated with a coexisting inflammation of the posterior urethra. Consequently, its subjective symptoms are practically indistinguishable from those of posterior urethritis, such being frequent and painful micturition, with severe vesical tenesmus, and shooting or dull, aching pain above the pubes, in the perinæum and rectum. The patient feels himself to be seriously ill, is slightly feverish, and unable to sleep on account of the urinary distress. The urine, which may be either acid or alkaline, is turbid, contains pus and epithelial cells and much mucus, and occasionally, towards the end of micturition, a little blood.

The differential diagnosis between cystitis and posterior urethritis is based principally upon the character of the urine. The following are the chief points of distinction: In cystitis the second portion of urine is not only markedly turbid, but is constantly so. That is to say, however frequently it is evacuated, the last portion passed is always more cloudy than the first. In posterior ureth-

ritis the turbidity is neither so marked nor by any means so constant. Again, if we make use of Jadassohn's three-glass test, it will generally be found in cases of cystitis that the urine in the third glass is more turbid than in the second, whilst in a simple posterior urethritis the turbidity in the second and third glasses is the same. The reason for this difference lies in the fact that in cystitis the pus sinks to the bottom of the bladder, and is evacuated with the last portion of urine. Although this test is of some value, an undue importance must not be attached to it, for it is obvious that if the amount of pus secreted in the bladder be slight, it will not collect to any appreciable degree. Moreover, should a considerable quantity of pus be regurgitated from the posterior urethra, it will make its way to the base of the bladder, and so simulate a cystitis. A more important diagnostic point is the fact that the pus from a cystitis generally shows large numbers of desquamated cells of the bladder epithelium.

Under suitable treatment the acute symptoms generally disappear in from seven to ten days, and the inflammation dies down, though, like most of these complications, it is very apt to relapse again on the slightest provocation, and not infrequently to settle into the chronic condition. Hence the prognosis is always grave, for though cystitis is only rarely directly fatal, yet it often leads to an inveterate chronic inflammation, with possibilities of still further extension to the ureters and kidneys.

Treatment.—In the acute stage, when pain and urinary distress are the chief features, the treatment is identical with that of acute posterior urethritis, to which section the reader is referred. Briefly stated, the treatment consists in rest in bed, light diet, gentle purging, and frequent hot sitz-baths. Salicylate of soda or salol are

generally the most useful remedies, though the balsams and urotropine are often valuable, more especially in the chronic condition. For the relief of the pain and tenesmus, belladonna suppositories are perhaps most efficacious. Morphia should be given with reluctance. As long as the acute symptoms last, all local treatment of urethra and bladder should be suspended. Later, when the pain and distressing symptoms have disappeared, gentle irrigation of the bladder and urethra may be started. For this purpose, bland, unirritating solutions should be selected at first, such as sulphate of thallin (1 per cent.) or boracic acid (2 per cent.). If this is well tolerated it may be changed later for a solution of one of the organic silver compounds, such as protargol (1 per cent.). In the chronic stages of the disease stronger solutions may be employed with advantage, especially those of silver nitrate. A detailed consideration of the treatment of chronic cystitis would be out of place here, as it offers no special features, and is fully described in the works on general surgery.

CHAPTER VI

PYELITIS AND PYELONEPHRITIS

Etiology. — An inflammation of the pelvis of the kidney, a pyelitis or pyelonephritis, arises occasionally in connection with urethritis, both in its acute and chronic stages. Apart from the rare occurrence of a metastatic deposit in the kidney tissues through the blood, the infection is brought about by an ascending inflammation from the bladder, by means of the ureter. The inflammation spreads, first from the urethra to the bladder, and then from the bladder to the kidney. In the large majority of such cases of pyelitis it will be found that, in addition to a chronic cystitis, there is some interference with the free evacuation of the urine from the bladder, such as the presence of a stricture. As long as the urine is voided freely there is little liability of an inflammation spreading from the bladder along the ureters. But when, in consequence of the straining occasioned by a stricture or some other cause, an increase in the intravesical pressure results, it leads to a dilatation of the ureters and their valve-like openings into the bladder, and so facilitates the spread of the infection along the ureters to the pelvis and kidney proper, thus giving rise to a pyelitis or pyelonephritis (surgical kidney). The infection is almost always a mixed one, bacterium coli and staphy-

lococcus predominating. It would be out of place to deal more fully with this condition here, as it belongs to the domain of general surgery.

There is, however, another variety of kidney infection in connection with urethritis, to which some attention must be paid. It is that which arises in consequence of the spread of a true gonococcal inflammation along the ureters. Many writers—amongst others, Finger—doubt that this ever takes place, or regard it as the rarest of complications. Others, myself included, on the other hand, believe that it is by no means so uncommon. There is, however, often great difficulty in conclusively proving its existence. The subjective symptoms provoked by such an infection are too vague and insufficient to be of any great diagnostic value. The most marked of them is the complaint of a dull, aching pain in the region of one or both kidneys. Less characteristic symptoms are the presence of a slight degree of fever (a fairly constant symptom), increased frequency of micturition, and a general feeling of malaise, with an occasional initial rigor. The diagnosis can only be established from an examination of the urine. As a rule it is either acid or neutral in reaction, and contains more or less pus. If the sediment be microscopically examined, there may be found, in addition to the leucocytes present, either renal epithelium or casts, proving conclusively that the kidneys are affected. Again, if the urine be tested for albumin, it will be found that it is present in a larger quantity than is accounted for by the amount of pus present.*

* To determine whether the albumin corresponds to the amount of pus present, a count of the leucocytes in the urine may be made by means of the Thoma-Zeiss apparatus. Even a quantity of pus in the urine shows a surprisingly small amount of albumin: 80,000 to 100,000 pus cells per cubic millimetre only gives 1 per cent. of albumin, as tested by Esbach's method. If, for instance, the urine of

It is necessary here to sound a note of warning, lest the mere presence of albumin in the urine in greater quantity than can be accounted for by the amount of pus should be taken in itself as a pathognomonic sign of nephritis. It is, of course, nothing of the kind. It is quite common to find albuminuria, pure and simple, in patients suffering from acute posterior urethritis or cystitis, independently of any form of kidney inflammation. The exact origin of this albumin is doubtful. It has been discussed under the section Posterior Urethritis. It will also be remembered that the urine of patients who are taking large doses of balsams sometimes becomes cloudy when treated with strong mineral acids, and thus simulates the presence of albumin. This turbidity is due to precipitation of a resinous acid.

Treatment.—Should there be reason to think that an inflammation was spreading up the ureters to the kidneys, the patient should be treated at once as if suffering from acute nephritis. He must have rest in bed, light, bland diet, and gentle aperients. For medicine, salicylate of soda or salol may be given; the balsams are too irritating to be recommended. In the chronic forms of pyelitis the chief indication is in the thorough treatment of the urethral and vesical inflammation. It is especially important to remove any mechanical obstacle to the free evacuation of the bladder.

a suspected case, containing 40,000 pus cells per cubic millimetre, yields 2 per cent. of albumin, it is clear that the quantity of albumin in the urine is greater than can be accounted for by the amount of pus present, and its origin must therefore be sought for elsewhere (Posner, 'Diagnostik der Harnkrankheiten,' III. Auflage).

CHAPTER VII

GONORRHŒA RECTALIS—STOMATITIS AND RHINITIS

The mucous membrane of the rectum is occasionally the seat of a gonorrhœal inflammation. It is far more frequent in the female than in the male, in whom it is decidedly rare. The infection may be conveyed to the bowel in several ways. Probably the most frequent cause is a lack of cleanliness on the part of the patient, causing the anal mucous membrane to become grossly contaminated by the urethral discharge. For obvious reasons this is far more likely to occur in women than in men. A rarer mode of infection is that brought about by the bursting of an acute prostatic abscess into the rectum. Lastly, inoculation may, and it is to be feared frequently does, take place through coitus per anum.

The symptoms generally begin by a sense of heat and discomfort about the anus and lower part of the bowel. This discomfort may increase in severity until it amounts to actual pain, especially on defæcation. The anal mucous membrane becomes swollen, œdematous, and prolapsed, and, at a later period, is often excoriated and deeply fissured. The inflammation does not always extend beyond the internal sphincter; but should it do so, the rectal mucous membrane becomes swollen, tender, and covered with a profuse purulent, and often blood-stained,

discharge. Although there seems little or no tendency for the inflammation to extend up the bowel beyond the rectal portion, there is a liability of the deeper rectal and perirectal tissues becoming involved. According to Mikulicz, this at a late and often remote period leads to severe cicatricial contraction and stricture of the rectum. An examination of the pus in the acute stage shows the presence of the gonococci in large numbers, on the finding of which the diagnosis entirely rests. The acute symptoms soon abate, and the inflammation disappears, but not infrequently a troublesome chronic rectal catarrh persists.

In the early stages the treatment consists of frequent cleansing of the lower part of the bowel with warm mild antiseptic solutions, such as boracic acid, protargol (2 per cent.), permanganate of potash (1 in 5,000), etc. The pain may be relieved by belladonna suppositories and frequent hot sitz-baths. In the chronic condition strong astringent injections may be given, more especially those of nitrate of silver and sulphate of copper. The anal fissures and excoriations are best treated by touching them with the nitrate of silver stick and the use of a simple ointment.

Stomatitis and rhinitis are decidedly rare, though they have been repeatedly recorded. They have been found in the new-born infant, as the result of infection by the vaginal secretion during parturition. There are also several well-authenticated cases of both rhinitis and stomatitis being met with in the adult. I have recently seen a gonorrhœal stomatitis in a barmaid. In this case the mucous membrane of the mouth was red, swollen, and granular, and, in places, superficially ulcerated. The appearance and symptoms were those of a rather severe simple stomatitis, but a bacteriological examination of the secretion showed

the presence of the gonococcus. The case was treated with astringent antiseptic mouth-washes, and the ulceration was painted with strong nitrate of silver solution; but the disease proved very intractable, and before complete recovery I lost sight of the patient.

CHAPTER VIII

GONORRHŒAL METASTASES

HITHERTO we have considered only such complications as have arisen from a direct extension of the urethral inflammation. It is now necessary to turn our attention to those which occasionally develop as the result of the gonococci escaping into the general circulation and giving rise to a form of septicæmia, with metastatic deposits. These metastases may occur at almost any period of the disorder, either in the acute or chronic condition. Most frequently they are met with in about the third week of the disease—that is to say, at about the time when posterior urethritis most commonly develops. Personally, I have never met with metastatic trouble in the male, save when the posterior urethra was also involved, though several observers have recorded its development not only in cases of anterior urethritis, but even in ophthalmia neonatorum.

Synovitis (Gonorrhœal Rheumatism).

The commonest place for such metastatic deposits to occur is in the synovial membrane of the large joints, where it gives rise to an acute inflammation of that joint, the so-called gonorrhœal rheumatism. The association of rheumatism with gonorrhœa has been recognised for

very many years, though naturally its true relationship was not understood until the gonococcus had been discovered. It would serve little purpose to trace the various theories and conjectures that have been put forward as to the relationship between the two conditions. It is now established beyond all doubt that the rheumatic lesions are due to the gonococci escaping into the blood-stream and lodging in the synovial membrane of the joint, and there setting up a more or less acute inflammation. Frequently, though not always, the specific cocci may be demonstrated in the effused fluid. As a rule, the infection is purely gonococcal, though at times other septic organisms may be present, more especially the staphylococcus. This rheumatic complication is found in about 2 per cent. of all cases of urethritis. It has a curious and marked tendency to affect certain joints in preference to others. This is well shown in the following table, drawn up by Finger from 376 cases recorded by various observers:

Knee	136
Ankle	59
Wrist	43
Fingers	35
Elbow	25
Shoulder	24
Hip	18
Jaw	14
Other joints	22

Unlike true rheumatism, gonorrhœal rheumatism attacks few joints at the same time—as a rule, only one or two.

The inflammation develops suddenly in most cases: the joint, which was apparently perfectly well a few hours before, suddenly becomes painful and swollen. The disease is, however, peculiarly variable in its course, sometimes coming on suddenly, and at others by slow degrees. It also shows a tendency to vary in accordance with the condition of the urethritis, each exacerbation or

relapse of the gonorrhœa causing an increase or return of the synovitis. So, too, if the rheumatism develops during an acute urethritis, it generally is also acute, the joint rapidly becoming painful and swollen, keeping pace with the urethritis and, under suitable treatment, disappearing with it in six or eight weeks. On the other hand, should the rheumatism develop in the course of a chronic urethritis, then the synovitis runs a less acute course, but disappears more slowly. Both forms are generally accompanied by some slight fever, though, naturally, in the chronic form it is less marked. As compared with true rheumatism, the fever is decidedly less marked and less persistent. In gonorrhœal rheumatism the joint becomes distended with a slightly turbid serous exudation, which under unfavourable conditions may become purulent. The skin over the joint is rarely reddened or œdematous. The exudation fluid in the joint undergoes gradual absorption, though occasionally it may last as a troublesome chronic serous exudation. More frequently the arthritis leads to a partial or complete ankylosis of the joint. A rare and grave development is the occurrence of suppuration; such cases frequently have a fatal termination. I have seen one in which nearly every joint in the body suppurated. It is characteristic of this form of rheumatism that the inflammation does not wander from joint to joint, but remains in that which is first affected, though others may subsequently become inflamed. Other gonorrhœal inflammatory troubles not infrequently develop during the rheumatic attack, such as endocarditis, iritis, and cyclitis, neuritis (more especially in the form of sciatica), tenosynovitis, and myositis.

Prognosis.—The prognosis is in general good. The effusion into the joint gradually becomes absorbed, and the joint regains its free movement. Yet it should be re-

membered that there is the possibility of some stiffness or ankylosis following, or else of an incomplete disappearance of the fluid and a chronic hydrops of the joint persisting.

Treatment.—The treatment calls for no special remark, other than that it should be on general surgical lines, as in any other acute synovitis—rest and fixation of the joint by means of light, well-padded splints, and anodyne applications to relieve the pain during the acute stage. Later, massage and gentle pressure to the joint by means of strapping or bandaging are useful in assisting the complete absorption of the fluid and in preventing stiffness. Should suppuration take place the joint must be freely opened and drained. The urethritis should be treated according to its condition at the time, especial care being taken to avoid provoking an exacerbation by heroic measures. Internally, salicylate of soda or salol should be given, rather for its beneficial action upon the urethra than with any idea of specifically influencing the synovitis. For, unlike true rheumatism, this disease does not respond to the salicines.

Endocarditis.

Next to the joints the part of the body most frequently affected by metastatic infection is the heart. Although for many years there was some doubt as to whether these cases were directly due to the gonococcus, this has now been abundantly proved both by cultural and inoculation experiments. Symptomatically there is little to distinguish such cases of endo- or peri-carditis from a like affection due to other septic organisms, and the true origin of the inflammation can only be inferred from its onset during an attack of urethritis. The accuracy of this diagnosis can naturally only be ascertained by a bacteriological examina-

tion after death. The disease seems at times to run a mild, benign course, and at others a deadly, malignant one. In the former case its presence may only be indicated by a sudden feeling of oppression and irregular and distressing action of the heart, accompanied by a slight rise of temperature, or, perhaps, by a rigor. Auscultation may reveal a soft mitral or tricuspid murmur. In the severer cases the temperature is high and rigors are frequent. The symptoms increase rapidly in severity and lead to a fatal issue. It is here unnecessary to discuss the subject at greater length. Recent investigations have shown that metastatic deposits of gonococci occur occasionally in many other parts of the body, giving rise to various forms of inflammation, such as pleurisy, peritonitis, meningitis, iritis, periostitis, osteomyelitis, cellulitis, etc. Such inflammations present no characteristic symptoms, and their true origin can only be traced by careful bacteriological examination. Lastly, there are certain nervous lesions attributable to the gonococcus, such as myelitis and peripheral neuritis. It is at present uncertain how far these are due to metastatic infection or to the circulation of the toxine in the blood.

PART III.

THE PROOF OF THE CURE OF GONORRHŒA: ITS BEARING ON MARRIAGE

One of the difficulties in the treatment of this disease arises from the fact that the patient is very apt to regard himself as restored long before a cure has been effected. As soon as the acute symptoms have subsided, and the pain and copious discharge have disappeared, he is likely to consider his complaint to have passed away, or at any rate to be no longer of importance, and therefore to withdraw himself from further treatment. Such a procedure is almost certain to be followed by a relapse, as the gonococci, not being entirely eliminated from the mucous membrane, are excited to greater activity by the patient's return to his former habits. It is necessary to emphasize the fact that the cessation of the discharge is no proof of the cure of the disease, and that the gonococci may remain in some portion of the urethra long after all apparent signs of the disorder have disappeared. It is therefore of much importance that we should carefully consider the means by which we may be able to decide definitely whether a cure has been effected or not.

Throughout the entire course of the disease the appearance and character of the urine form the simplest and best indication of the changes which are taking place in the urethral mucous membrane. So long as the urine is

turbid with mucus, and, on standing, deposits a layer of pus, we know that the urethra is acutely inflamed. And this may be either the early stage of a recent infection, or an acute exacerbation of a chronic condition. If the urine is turbid, but, instead of depositing pus, shows the presence of urethral threads, it is evident that the inflammation has passed into the subacute or catarrhal stage. And, lastly, the presence of threads floating in clear urine denotes the chronic localized condition.

Whilst the disease is in the acute or subacute stage there is little likelihood of either doctor or patient regarding it as cured. It is in the terminal stage alone that the difficulty of deciding arises. And here the difficulty may be very great, and the decision arrived at may be of much moment to the patient. It may not merely involve the question as to whether it is necessary for him to continue the treatment or not, but whether he is entirely free from the infection, and therefore in a fit state for marriage.

During the last few years the attention of the profession has been repeatedly drawn to the disastrous effects which gonorrhœa has upon the health of women. Previously it had been thought that, although the disease frequently gave rise to serious complications in the male, it was but a trivial, local malady in the female. We now know that this view was entirely wrong, and we have learnt to regard the disease to be not a whit less serious in women than in men. For, so far from the inflammation being localized to the vulva and urethra, it frequently spreads insidiously to the uterus, tubes, ovaries, and peritoneum, giving rise to grave trouble and danger in the form of endometritis, pyosalpinx, perioophoritis, and pelvic peritonitis. It is also a common cause of abortion and sterility. There are few pictures sadder than that which, all too frequently, meets the surgeon's eye in the rapid transformation of

a bright, healthy girl into a peevish, chronic invalid, the consequence of a gonorrhœal infection acquired early in married life.

It will be seen at once, therefore, to be of the utmost importance that we should be able to determine with certainty whether a supposed cure is actual or not, and so to be able to affirm with confidence that a patient who has suffered from this dire disease may marry without fear of infecting his wife. In order to do this effectually, a most careful and systematic examination of the patient is necessary. No value whatever must be placed on his assertion, however confidently made, that all discharge has completely ceased, and that there is nothing to be seen. Apart from the fact that he will naturally take the most favourable view of his own condition, the question cannot be determined by mere casual observation.

The first point to be decided is the presence or absence of the gonococcus in the urethral secretion or in the mucous membrane. So long as the coccus is present, there can be no question as to the patient's infectious condition and his requiring further treatment. At the same time it must be noted that the detection of the gonococcus in the later stages of urethritis is far from easy, and that it demands considerable experience and patience. For in this stage the micro-organism is present in very sparing numbers, and is no longer found in its characteristic situation within the body of the leucocyte, as in the acute stage. Confusion as to the identity of the organism is under such circumstances much more likely to occur than in the earlier stages of the attack, and all the resources of bacteriology may have to be invoked to establish the diagnosis. But, further, it frequently happens that the organism is absent from the secretion for days, and even weeks, together, and only reappears

when the urethra is unusually stimulated from any cause, such as sexual excitement or indulgence in alcohol.

In the intervals the micro-organisms may be lying *perdu* in some of the numerous crypts and follicles with which the urethra abounds. Hence, when attempting to decide whether the gonococcus is still present or not, it is necessary not only repeatedly to examine the secretion at intervals, but also to take such steps as will induce a certain stimulation of the tract, and to pay special attention to the contents of the seminal vesicles and of the prostatic and urethral glands.

Fig. 36.—Urethral Thread in Chronic Urethritis.

It may be convenient here to discuss the details of such an investigation. The first step is to examine the urine (preferably that passed in the morning on rising) for any threads or deposit. If any be discovered they should be stained and microscopically examined. At this stage the threads will probably be found to consist of numerous epithelial cells and a few pus cells held together by mucin (Fig. 36). Should the pus cells largely predominate, the probability that the disease is cured is distinctly small. If no gonococci are found, all treatment should be suspended, and, after an interval of a few days, the urine

must be re-examined. If the disease is not cured the stopping of the treatment will probably lead to an increase in the number of the threads and, possibly, to the re-appearance of the micro-organism. Should no gonococci be found, the contents of the seminal vesicles and prostatic glands should be expressed by massage per rectum, and their secretion examined. To obtain the contents of the urethral glands, the method of von Crippa is usually employed. A large acorn-headed bougie is swept up and down the anterior urethra, whilst the surgeon gently compresses the penis between the flat of his hand and the abdominal wall of the patient. By this manœuvre the contents of the crypts and follicles are expressed, and appear as a bead of secretion at the meatus, or clinging to the head of the bougie.

The next step in the examination is to ascertain if the gonococci reappear after stimulation of the urethral mucous membrane. To this end the restrictions which had been placed upon the patient's diet may be removed, more especially as regards the taking of alcohol, and he may be invited to drink somewhat freely of beer or wine on one day, and to submit himself to examination on the day following; or the urethra may be irrigated with an irritating lotion, such as nitrate of silver (1 in 2,000), the day before the examination. Instead of, or in addition to, the irritating injection, the urethra may be dilated by the passage of a large bougie, or, better still, by means of a dilator. This last is the most powerful means we have of bringing any hidden focus of infection to the surface, for it not only irritates the urethra, but squeezes out the contents of the numerous mucous follicles, in the depth of which the gonococci are so apt to lurk.

A new method of bringing any hidden gonococci to the

surface has recently been suggested by Alexander.* It consists in the injection into the urethra of a dilute solution of peroxide of hydrogen. As soon as this fluid comes into contact with blood, pus or bacteria, it splits up into water and oxygen under strong effervescence. The gas so liberated mechanically detaches and carries away any broken-down epithelial cells, leucocytes, and bacteria which may be present. Alexander claims that by this means gonococci can be liberated and brought out of their hiding-place without injury or irritation to the mucous membrane, and that it avails in cases where all the usual methods have previously failed. For this purpose he uses Merk's preparation of H_2O_2, which contains 30 volumes by weight of peroxide of hydrogen, and dilutes it with 29 parts of water. The fluid is injected and allowed to remain for about a minute in the urethra. The foam which then exudes from the meatus is collected on a glass slide and, after being fixed and stained, examined microscopically. In my own, at present limited, experience of this method, I have found it simple and efficacious; but it is yet too soon for me to attempt to estimate its value in comparison with the other methods.

If, after a thorough and repeated examination, no gonococci can be discovered, are we justified, ipso facto, in declaring the patient to be no longer infectious, and in giving our sanction to his marriage?

On this point there is a difference of opinion amongst the various authorities. Some† would confidently answer the above question in the affirmative, on the ground that the only criterion of the infectiousness of a urethritis

* 'Centralbl. für die Krankheiten der Harn und Sexual-Organe,' Bd. 16, Heft 4, 1905.

† Neisser, Jadassohn, Scholtz.

is the finding of the gonococcus. Other authorities,* however, are of opinion that it is not safe to rely solely on the negative evidence of the bacteriological examination, no matter how thoroughly soever it may have been made. They contend that due consideration must be given to other factors, such as the character of the urinary threads and the appearance of the mucous membrane, as seen by the urethroscope. They hold, and my experience entirely confirms this view, that as long as the threads are largely composed of pus cells, one is justified in being suspicious that the gonococcus still lurks somewhere in the urethra. And they affirm that before the surgeon can confidently assert that the patient is no longer infectious, not only must the gonococcus be absent from the secretion, but also the mucous membrane must have regained its normal bright glistening appearance; its longitudinal folds must be clearly defined, and it must be free from all inflammatory areas.

Although the continued presence of threads containing pus cells is rightly to be considered as a reason for regarding the patient with suspicion, yet we are far from being warranted in assuming, as Levin† does, that the gonococcus is therefore necessarily present. For such threads may be produced by other forms of urethritis than that arising from the gonococcus.

Should the microscopical examination show that the threads consist almost wholly of epithelial cells, the same importance must not be attached to their appearance in the urine. For it sometimes happens that, long after the gonorrhœal inflammation has subsided, such threads are passed, and are merely evidences of a desquamative

* Oberländer, Kollmann, Wossidlo, Levin.

† Levin, 'Wann können wir die Gonorrhœa als geheilt ansehen?' *Arch. für Derm. u. Syph.*, Bd. 55. s. 32.

catarrhal condition, kept up by the astringent injections.

If the persistence of threads formed of pus cells is a sufficient reason to warrant the surgeon in hesitating to give his consent to the patient's marriage, must it also be regarded as a condition demanding continuous treatment?

As long as such threads are passed, it is certain that some part of the urethra is still inflamed, and the patient cannot be regarded as in a satisfactory condition. A determined effort, therefore, should be made to ascertain the exact origin of the threads, and to cause their final disappearance. But in treating gonorrhœa, as, in fact, all diseases, the patient must be considered as well as the disorder. We must be careful lest in our anxiety to eradicate the last vestige of inflammation we unduly prolong the treatment, and, by centering the patient's thoughts too much upon his trouble, we induce serious neurasthenia and hypochondriasis.

Notwithstanding the very considerable advance which has been made in the treatment of gonorrhœa during recent years, an advance which enables us to cure an ever-increasing number of inveterate cases, it must, however, be frankly confessed that there are certain cases which it is not in our power thoroughly to cure—where the deeper structure of the urethra, and more especially the prostatic glands, are profoundly affected, and where in spite of persistent and appropriate treatment some of the symptoms still persist. In such cases we shall only do harm by remorselessly continuing the treatment.

INDEX

Abortive treatment of gonorrhœa, 49, 50
Abscess, follicular, 104
  of the prostate, 114
Acorn-headed bougie, 79
Adenitis, 106
Albuminuria in posterior urethritis, 21, 22, 132
Anatomy of the urethra and bladder, 3
Arthritis gonorrhoica, 136-139
Azoospermia after epididymitis, 110

Bacteriuria, 26
Balanitis, 99
  diagnosis of, 100
  symptoms of, 100
  treatment of, 101
Bladder, form of, 7, 8
  inflammation of, 125
  sphincters of, 6
Bladder-neck, 7, 12, 125
'Bon-jour' drop, 71
Bougie, acorn-headed, 79
  medicated, 92
  metal, 93
Bubo, 106

Calibre of the urethra, 3, 81
Canals, para-urethral, 101, 102
Caput gallinaginis, inflammation of, 69, 84, 85, 86
Cavernitis gonorrhoica, 104
Central figure of the normal urethra, 84
  in chronic urethritis, 86
Charrière's urethral scale, 79, 80
Chorda venerea, 17
Chordee, 17, 105
Compressor urethræ muscle, function of, 12, 13, 23
Copaiva balsam, 43
Cowper's glands, inflammation of, 105
Crystals, sperm, 118
Cystitis, 125
  diagnosis of, 24, 25, 127, 128
  pathology of, 126
Cystitis, prognosis of, 128
  symptoms of, 127
  treatment of, 128, 129

Deferentitis, 108
Diday's method of irrigation, 61
Dilatation treatment of chronic urethritis, 93
Dilators, urethral, 94
Dittel's bougie, 93

Endocarditis gonorrhoica, 139
Endoscope, 81
  how to use, 83
  Schall's (Fig. 21), 82
  simplest form of (Fig. 20), 82
  Valentine's (Fig. 22), 83
Eosinophile cells, 37
Epididymitis, 107
  azoospermia after, 110
  cause of, 107
  diagnosis of, 109
  prognosis of, 110
  symptoms of, 108
  treatment of, 110
Expectant treatment in acute gonorrhœa, 50

Feleki's instrument for massage, 78
Filaments in the urine, 34, 35, 70, 71, 72
Five-glass test of Kollmann, 24
Folliculitis urethralis, 104
  symptoms of, 104
  treatment of, 105
Funiculitis, 108

Gonococcus, appearance of, 29
  cultivation of, 31
  detection of, in acute gonorrhœa, 28
  in chronic gonorrhœa, 32, 143
  discovery by Neisser, 2
  in acute gonorrhœa, 28

Gonococcus in chronic gonorrhœa, 32, 76, 143
multiplication of, 30
staining of, 28, 29
by Gram, 30
Gonorrhœa, bacterial diagnosis of, 27
early views of, 1
later views of, 2
limits to treatment of, 148
proof of cure of, 141
bearing on marriage, 146
See also Urethritis
Gram's stain, 30
Guyon's bougies, 94
instillation syringe, 63

Hæmaturia, terminal, 21, 57
Hæmospermia, 123

Incubation period of acute gonorrhœa, 15
Infiltration, urethral, hard, 86
soft, 86
Instillation, urethral, 62
Internal treatment of acute gonorrhœa, 41
of chronic gonorrhœa, 90
Irrigation, Diday's method, 61
Janet's method, 59
test, 25, 26

Jadassohn's three-glass test, 24, 128
Janet's method of irrigation, 59
treatment of urethritis, 64

Kidney, inflammation of, 131
Kollmann's dilators, 95
five-glass test, 24

Lymphadenitis, 106
Lymphangitis, 106

Massage of prostate, 78, 117, 118, 119, 120, 145
Medicinal treatment of acute gonorrhœa, 43
of chronic gonorrhœa, 90
Metastatic inflammation, 136
Micro-organisms of pseudo-gonorrhœa, 28
Microscopic examination in pyelitis and nephritis, 131
in spermato-cystitis, 123
of prostatic secretion, 77, 118
of urethral secretion, 75, 143
Micturition, physiology of, 10

Neisser's discovery of gonococcus, 2
division of chronic urethritis, 77
Nephritis, 131
Neurasthenia sexualis, 73

Oberlander's dilators, 95
Ockart's syringe, 51
Oligospermia after epididymitis, 110
Orchitis. See Epididymitis

Papillomata, 102
treatment of, 103
Paraphimosis, 100
Para-urethral canals, 101
Peri-urethral inflammation and abscess, 104
Permanganate of potassium treatment, Janet's, 64
Phimosis, 100
Phlegmony, periprostatic, 114, 115
Proctitis, 133
Prophylactic treatment of gonorrhœa, 50
Prostatic secretion, normal, 118
in prostatitis, 77, 119
sphincter, 6
Prostatitis, 67, 114
acute, 114
chronic, 116
symptoms of, 117
treatment of, 119
Prostatorrhœa, 73
Pseudo-gonorrhœa, 28
Pus, acute gonorrhœal, 29
Pyelitis and pyelonephritis, 130
etiology of, 130
treatment of, 132

Rectum, inflammation of, 133
Relapses in gonorrhœa, 40
Rheumatism, gonorrhœal, 136
Rhinitis, 134

Secretion in acute gonorrhœa, 34
in chronic gonorrhœa, 75, 143
in prostatitis, 77, 118
in spermato-cystitis, 123
Seminal vesicles, inflammation of, 122
Spermato-cystitis, 122
acute, 122
symptoms of, 123
treatment of, 124
chronic, 123
treatment of, 124
Sphincter vesicæ externus, 6
internus, 6
Stomatitis, 134
Stricture of urethra, 71
of wide calibre, 79
of rectum, 134
Suspensory bandage, 112

Synovitis (gonorrhœal rheumatism), 136
prognosis of, 138
treatment of, 139
Syringe, injection, 52
large urethral, 91
Ockart's, 51

Tenesmus, urinary, in acute posterior urethritis, 20, 57, 58
in chronic posterior urethritis, 73
in cystitis, 127, 129
in prostatitis, 115
in spermato-cystitis, 123
Test, five-glass (Kollmann's), 24
irrigation, 25, 26
three-glass (Jadassohn's), 24, 128
two-glass (Thompson's), 22
Thompson's, Sir H., two-glass test, 22
Threads, urethral, 34, 35, 70, 71, 72
Three-glass test of Jadassohn, 24, 128
Two-glass test of Sir H. Thompson, 22

Ultzmann's instillation syringe, 63
Urethra, anatomy of, 3
anterior and posterior, 5, 14
and bladder, 5, 7
appearance of, during healing, 87
of, when chronically inflamed, 85
dilatation of, 93
lumen of, 3, 4
membranous portion of, 84
normal prostatic, 85
bulbous portion of, 85
Urethral irrigator, Valentine's, 60
mucous membrane, change in, during progress of disease, 37
Urethral secretion, appearance in earliest stage of gonorrhœa, 35, 36
morbid changes in, 34
Urethritis, signs of cure of, 54, 55, 143
acute, 15
Urethritis, pathology of, 37
treatment of, 41-48
anterior, 15
exacerbation of, 18
symptoms of, 16, 17
treatment of, 49
posterior, 19
diagnosis of, 22
symptoms of, 20
treatment of, 56-65
to determine presence of, 25
chronic, 66
classification of forms of, 69, 89
diagnosis of, 74
Neisser's division of, 77
pathology of, 68
pus of, 77
symptoms of, 70
treatment of, 89
summary of treatment of, 97
See also Gonorrhœa
Urethroscope, use of, 83
Urethrocystitis, 125
Urethrometer described, 79
Otis's, 80
Kollmann's, 80
Weir's, 80

Valentine's endoscope, 83
urethral irrigator, 60
Vesiculitis. See Spermato-cystitis

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